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AMERICAN JOURNAL OF OPHTHALMOLOGY

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JUNE, 1920

No. 6

PSEUDOTUMORS OF THE UVEAL TRACT.

EDWARD JACKSON, M.D.,

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With report of two cases simulating uveal sarcoma are here associated brief notices of other cases, numbers of which are to be found in the literature. It is concluded that eyes retaining useful vision should be observed until a positive diagnosis can be made, altho an eye needlessly sacrificed for the individual may be very valuable to science.

Tumor, which originally meant any swelling, has come to have a restricted meaning, that is hard to define, but quite definite in its common use as more or less synonymous with neoplasm. In this sense the most important tumor of the uveal tract is sarcoma; altho carcinoma and angioma are not excessively rare. The differential diagnosis between these, and tuberculoma, syphiloma, hematoma, and inflammatory swellings is of practical importance. For the former, local measures, excision or possibly applications of X-rays or radium are essential; for the latter appropriate general treatment is to be considered.

In the diagnosis of glioma, the recognition of inflammatory changes in the vitreous under the name pseudoglioma, has given impetus to the diagnosis of retinal tumors. Pseudotumors of the orbit have also been frequently considered, with the view of discriminating between them and tumors in the restricted sense. The choroid, iris, and ciliary body also furnish a considerable class of lesions that more or less closely simulate the true tumors. To think of them as pseudotumors is likely to fix attention on those peculiarities of appearance, progress, and history that may reveal their difference from tumors in the restricted sense—the neoplasms.

THE IRIS.

Most lesions of the iris are so open to inspection, that error or uncertainty

with regard to their nature can be set at rest by repeated careful examinations, extended over a sufficient length of time. I have seen a few thickenings and pigment spots of the iris that had been regarded with suspicion by others; but which I thought nonprogressive and devoid of danger. I have also seen one case of long noticed pigmented thickening of the iris, which I regarded as probably a slow growing sarcoma, while others thought it not of that character, on account of its long duration.

In 1893 I saw with Dr. M. W. Zimmerman of Philadelphia, a patient who presented in each pupil a darkly pigmented mass, apparently projecting from the back of the iris; which he thought, and I agreed with him, was probably a melanotic sarcoma. The late Dr. George C. Harlan was also consulted. He pointed out that the smoothness of the iris in front of these pigmented masses seemed to indicate that the attachment was not to the iris, but probably to the anterior portion of the ciliary body; and that the outline of the mass in the pupil was rather that of a cyst.

If this condition had affected but one eye the patient would have been urged to have it enucleated at once, altho vision was good. But this could not be advised for both eyes. Dr. Zimmerman kept the case under observation, and studied it for four years. He then reported it¹ as a case of probable

cysts arising from the ciliary body. The masses had not changed much, but remained a good deal as when first seen.

In a case reported by Stephenson² a similar appearance was observed in the pupil, and the diagnosis of melanoma made and the eye enucleated. After enucleation, with transillumination of the globe "the pigmented mass appeared as a solid projection jutting into the illuminated pupil." Microscopic examination revealed one large and several smaller cysts, formed by separation of the layers of the iris.

THE CILIARY BODY.

The ciliary body, hidden from ordinary inspection and normally opaque to transillumination, rarely gives direct external evidence of disease. But gumma of this region occasionally gives rise to an appearance of tumor. Another rare and very instructive condition is reported in this journal for May, p. 372, by Dr. Harrington.³ The tumor at the limbus, a common location for dermoids, presented the usual appearances and history of a dermoid tumor. But when the attempt was made to remove it, its real nature was found to be a coloboma of the sclera, with hernia of uveal tissue.

When, by pressing in the ciliary region for the ophthalmoscopic examination, after the method of Trantas⁴, this part is brought into view, the same appearances might be presented as are seen in other parts of the fundus in ordinary ophthalmoscopy.

CASE 1. L. L., a boy aged 13, who had puzzled three colleagues in San Francisco, was brought with vision in the right eye reduced to moving objects. The pupil dilated to 7 mm., but showed numerous posterior synechiae. There were some streaks of opacity and general haze in the vitreous; but not enough to prevent seeing rather fine details of the fundus. The cornea and lens were clear.

At the extreme periphery of the fundus, as ordinarily seen, began a grayish white swelling, sharply demarcated from the adjoining normal choroid, and extending forward to the cil-

iary processes. The retinal vessels passed in front of it, becoming 3 D. more hyperopic upon it, changing from 10 to 13 D. No folds or fluctuation were seen in the retina.

The left eye was normal V. = 1.2. Both eyes transilluminated fairly, and equally. The appearances might well have been those of sarcoma. But a history of some redness and soreness of the eyeball at the start, ceasing after removal of his tonsils, with the synechiae revealed in the dilated pupil, and the fair transillumination, were taken as pointing rather to uveitis.

A year later corrected V. = 0.3, the grayish white mass had become white, and shrunken, with choroidal atrophy; and slight pigment deposits.

THE CHOROID.

Eyes have been removed for sarcoma of the choroid, when they contained no sarcoma. In some cases there seems to have been little evidence to support the suspicion; but in others the most thoro expert examination left great uncertainty as to whether or not a neoplasm were present. The following case presented puzzling appearances.

CASE 2. O. L. R., a man aged 59, was seen 1913, Oct. 15. Vision in the right eye had been failing for about six months. He was unable to read with it for three months. The dimness first was noticed a little below and to the left of the point looked at, but soon included the fixation point. It grew worse gradually. He had been given potassium iodid, but his sight continued to grow worse. He had a doubtful Wassermann, probably negative.

EXAMINATION.—Vision R. 1/15; L. 1. Hyperopia 2 centrads. Otherwise his eyes externally were normal. In the right, in the region of the macula, a circular area twice the diameter of the disc, was lighter and grayer than the general fundus. This was bounded by a narrow light border, better seen when the light was thrown on it at certain angles—a reflex. This area was 3 D. more prominent than the surrounding fundus, its edge rising abruptly. Its surface was almost uniform in appear-

ance. Some of the retinal vessels showed a slight break at the margin of the area. This area was not blind, a 2.5 mm. white object was seen in every part of the corresponding field against a black ground at 50 cm. The physiologic blind spot was not enlarged.

The accompanying sketch (see color plate facing p. 397) was made chiefly

tinguishable. Vision R. = 0.2. The patient thought the sight was "slowly creeping back."

April 15. Corrected vision R. 0.6 some metamorphopsia—a horizontal line looks wavy. The macular area is now at the level of the surrounding fundus. Rather large yellowish dots form somewhat of a wreath in the affected area, near its margin, with some

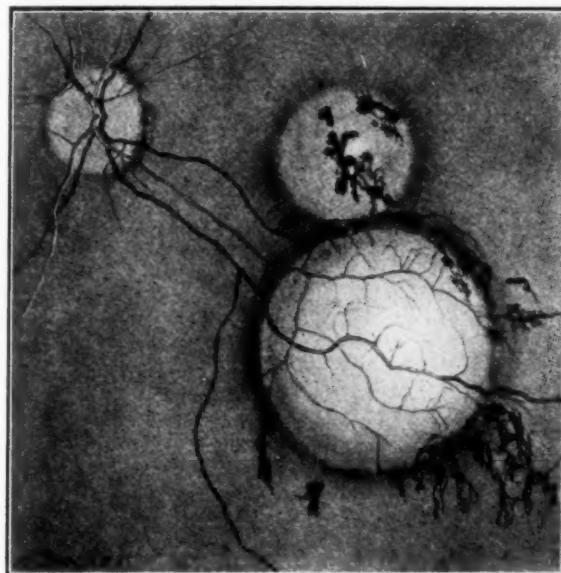


Fig. 1.—Inflammatory exudate, simulating sarcoma of choroid. (Randolph's case.)

to fix the boundaries of the area, with reference to the smaller branches of the retinal vessels. Potassium iodid was ordered to the limit of tolerance.

Nov. 22. The area above described had not increased. Possibly it had extended a little downward. Probably it had contracted a little above. The most prominent point, toward the temporal margin, was only 1.5 D. in advance of the neighboring fundus, and the margin of the area was no longer abrupt. Vision still R. = 1/15.

1914. Jan. 21. The K. I. had been increased to 26 grams three times a day causing rhinorrhea. It was stopped and decreased to 10 grains at a dose. The color of the area was now the same as that of the surrounding fundus, the margin was no longer dis-

massing of them at the upper part. The foveal region was rather gray. There was one pigment blotch about $\frac{1}{3}$ disc diameter across, toward the nasal edge of the area. The retinal vessels looked normal.

The left eye remained normal throughout, with corrected V. = 1.2.

This patient has not been seen since. At the end of six years from the time he was last seen he writes he has had good health but that he has found the sight worse within the last year, so that he "cannot read anything but headlines with it."

OTHER CASES.

One of the most striking recorded cases of this kind is that shown by the late R. L. Randolph⁵ at the meeting of

the American Ophthalmological Society in 1910, and represented in Fig. 1, reproduced from the Society's Transactions. This was the case of a man aged 28, who had been losing the sight of his left eye for over a year. Dr. Randolph was inclined to think the mass an inflammatory exudate. No one who saw the case offered more than a possible diagnosis. Scleral tumor, gumma, and tuberculoma were suggested, beside sarcoma.

Three years later, Dr. Randolph reported⁶ that in spite of negative Wassermann and tuberculin reactions, potassium iodid 100 grains three times daily for 7 months, and tuberculin twice a week for three months had been tried; but without effect. Lately the lower nasal aspect of the mass had been getting irregular, as tho undergoing absorption.

Hird's case⁷ must have presented appearances closely resembling the above Case 2. No picture is given but the description of the clinical appearances is as follows: "The macular region was occupied by an almost circular pale yellowish white area which was raised above the general level of the fundus, the swelling measuring just four diopters in the center. The edges of this swelling were sharply defined, and there appeared to be no change in the choroid and retina around it. Springing from the upper and outer part was a prolongation, like a tail, which ran upwards and outwards, widening and losing its definition until it was lost in normal fundus at the periphery. There was some pigment at the lower and outer part of the swelling, and also some pigment at the root of the tail and along it. There were three hemorrhages in the retina, two between the swelling and the optic disc, and one at the superior border of the tail just where it joined the main mass. There were some fine pigment dots in the retina scattered about the fundus below the swelling. Branches of the retinal vessels—both arteries and veins—ran over the surface of the swelling. There was no detachment of the retina anywhere to be seen, and

the peripheral field of vision was normal."

This case was shown at the Midland Ophthalmological Society, but no one ventured to make a positive diagnosis. Both doctor and patient preferred to have the eye removed. The showing of the microscopic examination is referred to below.

In Ormond's case⁸ "on examination of the left eye a large solid detachment of the retina was seen situated below and on the outer side of the optic disc. The inferior temporal vessels passed over it. The detachment was circular and dome shaped, with a white soft looking surface, edged by numerous small hemorrhages. The top of the swelling was seen with a +7 D. Sph." In spite of the negative report from a medical examination, tuberculin injections gave a reaction, and three months' tuberculin treatment noticeably reduced the size of the tumor.

Wray reported⁹ a case in which the ophthalmoscope showed "the posterior part of the globe is occupied by a large spherical neoplasm probably at least five or six times the diameter of the disc. Its anterior surface is seen with a +18. sph. The retinal vessels course over its anterior surface and run evenly with little distortion, whilst the retina itself is fairly translucent, and in places there can be seen thru its texture what appears to be larger vessels, roughly about twice the diameter of the retinal vessels." Because of its translucency this was supposed to be a cyst. But in discussion Harman instanced a case of translucent detachment, caused by a sarcoma arising from the optic nerve entrance and quite out of reach of transillumination.

In the case of Paton and Collins¹⁰, the large translucent detachment of the retina was assumed to be due to angioma, because there was a large nevus at the margin of the orbit. This diagnosis was confirmed after enucleation.

In Friedenwald's Case 1¹¹, the ophthalmoscope showed in the right eye "in the upper nasal quadrant, reaching to a point near the upper inner margin of the disc, a large, bluish gray,

rounded, elevated mass, the highest part of which could be seen with +12 D. The projection of the growth was, therefore, about 10 D. into the vitreous, indicating a thickness of a little more than 3 mm. The extent of the growth was about six or eight times that of the optic disc."

Numerous other cases have been reported in the literature in which the question of choroidal tumor had to be seriously considered, but was negatived by the subsequent course of the case or the microscopic examination of the enucleated eye.

NATURE OF PSEUDOTUMORS.

Enough such eyes have been removed to furnish a list of pathologic conditions found that is rather a long one. In my Case 2, and also in Randolph's, the tumor was probably a choroidal or retrochoroidal inflammatory exudate. Ormond's case was probably tubercular. In Wray's patient, the lesion appeared to be a cyst, altho no evidence of its parasitic origin was discovered.

Hird found in the eye he removed a retinal mass 5 mm. in diameter and 1 mm. thick; which a committee composed of Collins, Parsons, and Mayou considered was a form of retinal disease with massive, exudation, as described by Coats¹². Friedenwald's second case was of the same character. His first case proved to be one of granuloma of the choroid possibly tuberculous.

On a diagnosis of sarcoma of the choroid Knapp¹³ excised an eye; and found on microscopic examination a subretinal exudate of organized connective tissue, embedding the retinal pigment epithelium. The choroid showed no inflammatory infiltration; and its vessels and those of the retina were normal. Batten¹⁴ reported a case of symmetric swellings in the macular region of each eye apparently due to subretinal hemorrhage. Clarke and Bickerton¹⁵ recorded one in which the

doubtful "new growth in the choroid," in a man of 80, followed repeated hemorrhages.

PRACTICAL CONCLUSIONS.

These cases have been brought together to enforce certain points applicable in the practice of every ophthalmologist.

Pseudotumors of the uveal tract occur, which on first examination present every appearance of true tumors—malignant neoplasms.

These masses vary widely in character and causation. After careful and prolonged tests for syphilis and tuberculosis, the widest range of investigation may throw little light on the origin or the essential character of the lesion.

Malignancy of such lesions can usually be excluded, by watching them over a period of several months or even years. Atrophy of adjoining parts of the choroid, or pigment deposits such as accompany choroidal atrophy, oppose the idea that the lesion is really a neoplasm. Very careful drawings should be made when the case is first seen; and the appearances found subsequently compared with them, to determine if the tumor is extending.

So long as the mass does not increase, watchful waiting is justified, if the eye still retains vision. If the tumor is malignant early removal is of course to be recommended. But for a choroidal sarcoma in the first stage the risk from a few weeks' delay until it shows unmistakable progress is problematic, and scarcely to be weighed against the loss of a useful eye on a doubtful diagnosis. If the affected eye is already hopelessly blind, that is another matter. Such an eye should be removed on the mere suspicion of malignancy. But for a seeing eye, true conservatism requires careful observation; with full records of the conditions present and delay until time makes a more positive diagnosis possible.

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HYPERPLASTIC SUBCONJUNCTIVITIS.

H. McI. MORTON, M.S., M.D., F.A.C.S.,

MINNEAPOLIS, MINN.

This paper reports a new case with abstract of three previously reported of tumor masses which its author thinks should be recognized as a distinct clinical type. With illustrations of the appearance of the eye when first seen and microscopic details of the hyperplastic tissue.

In the issue of the *Journal of the American Medical Association* of December 4, 1897, I reported under the above title, three cases, presenting features that seemed to entitle them to be considered as representing an ocular disease of a distinct type, and worthy of recognition as a distinct clinical entity. That the condition is rare is evidenced by the fact, that, since these cases were reported, twenty-three years have elapsed before I have seen another; and also by the observation, that, in literature, there is to be found practically, or almost absolutely, nothing referring to a like clinical picture, if one excepts the brief mention of this condition by Berry of Edinburgh in his most excellent textbook published about twenty-five years ago, and accompanied by a very good colored illustration.

The syndrome that presents itself is, in the main, about as follows: A more or less extensive hardened, or very firm, tissue mass (see Fig. 1), involving the lower palpebral conjunctiva. In no case has the upper portion of the culdesac been extensively involved. This mass is covered with a thickened conjunctiva, which may show vascular injection, but

is otherwise free from acute inflammation. The size of the elevation may be comparatively small, involving but a third, or less, of the palpebral conjunctiva. It may be a deep and general hyperplasia that leaves none or very little of this membrane after removal of the growth. It may assume a sessile character at its attachment, and bulging out from this, into a large mass; or again it may assume a somewhat pedunculated form, and extend along the whole line of the lower conjunctiva. One case presented a thick plaque like phase; and in this instance,—probably in what may be an atypical one—the plica semilunaris was involved, the disease in this case being more bulbar than palpebral.

Pain has not accompanied the condition, and traumatism has probably been the exciting cause in all of the cases. In two of the cases this was a direct violence from injury, in the others the probable cause being sand or dust. In none of these has there been a history of previous disease of the eye. There was, throughout the culdesac, no evidence of granulation in the affected eyes, nor was there any such in the unaffected eye. After treatment no relapse occurred in

any of the cases, and the established normality left no evidence of the condition.

In one case the hyperplastic growth was 2.5 cm. long, 1.5 cm. broad, 1.5 cm. thick and weight 2 drams; in another case the involvement was less, being about 1.5 cm. by about 2 cm. Where direct trauma has played its part, the rapid onset, and development of the picture, are characteristic and complete.

Berry, after stating that he has seen very few such cases in his experience, suggests that the condition may disappear spontaneously. In none of these cases was this tendency observed, and it is my impression that such resolution would come about in the milder forms of the disease only; and then possibly after an extended period. Before commenting farther I will report the four clinical pictures referred to.

CASE 1. A. V., white, aged 35. The man, a tobacconist by occupation, consulted me July 23, 1894. He had had no previous ocular trouble. Two weeks ago, falling from a bicycle, he was thrown into a bush, a broken stalk of which lacerated the lower conjunctiva of the left eye. Two days after this he noticed a large fleshy mass protruding from the swollen lids. The usual antiphlogistic measures not availng, I saw him two weeks later at my office.

Inspection revealed great infiltration of the upper and lower lids, in both of which existed an external wound, each communicating with a cavity formed by the breaking down of the cellular structure of the subcutaneous tissue of the lids, and from which there was free discharge of pus. These cavities did not communicate with the culdesac. A red tumor mass projected from the interpalpebral fissure, springing from the surface of the lower palpebral and bulbar conjunctiva, involving the entire lower culdesac to within 1 mm. of the corneal limbus, and extending from the outer to the inner canthus. It resembled a large granuloma, was firm in consistence and shiny. There existed a marked infiltration of the con-

junctiva in the fornix of the upper lid, and there was much associated chemosis of the upper bulbar conjunctiva. The movements of the globe were almost entirely restricted. The cornea was transparent, iris normal, and the pupil normal in size and in reaction. Media of the eye were clear and fundal findings negative. There was absence of pain.

The patient was admitted to the hospital, where, under anesthesia, pieces of wood and bark were removed from the wound, and the infiltration incised freely in several places from canthus to canthus. It was of a very dense structure, seemingly almost cartilaginous. After two weeks the phlegmonous inflammation of the lids had subsided, but the mass had increased in size. Altho I feared a malignant growth, no other course remained but its enucleation. Under general anesthesia this was dissected out. It was found adherent to the episcleral tissue of the anterior part of the globe; and, extending somewhat beneath, was a firmly adherent projection to the upper palpebral conjunctiva, beginning 5 mm. from and extending to the inner angle. The removal of the tumor left the lower culdesac practically denuded; and, to avoid symblepharon, a Wolfe graft was taken off the left arm. This took excellently, and left a freely movable globe. There remained an almost complete ptosis, for which, on October 5, I performed a Panas operation.

Microscopic examination revealed a mass of granular consistence, which below assumed a dense and elastic character, and terminated in stringy nodules. It weighed two drams, was 2.5 cm. long, 1.5 cm. broad, and 1.5 cm. thick.

Microscopically; sections studied showed the tissue simply hyperplastic. There is no tumor proper, only infiltration of the normal tissue with round cells. The patient recovered rapidly and there has been no return thruout these many years.

CASE 2. S. R., white, no history of ocular trouble until three months ago. At this time, his father informs me, his

eyes were inflamed, but had not caused him great inconvenience. Two weeks ago there was noticed a growth projecting from between the lids. This now extends from canthus to canthus and is as large as my little finger.

Its attachment was along a narrow line, situated on the conjunctiva of the lower lid, about 2 mm. from the lid margin. A cross section of this growth much resembled that of a railroad rail. The hyperplastic mass was removed,

same as the normal eye. I did not see this case subsequently.

After a long interval, during which neither in my office nor at my clinic, was there a case of this disease, one has recently presented itself. This is an exceedingly typical case, both as regards the history and the clinical picture presented.

CASE 4. Mr. O. C., white, aged 42, presented himself at my office April 28, 1919. Two weeks previously, the left

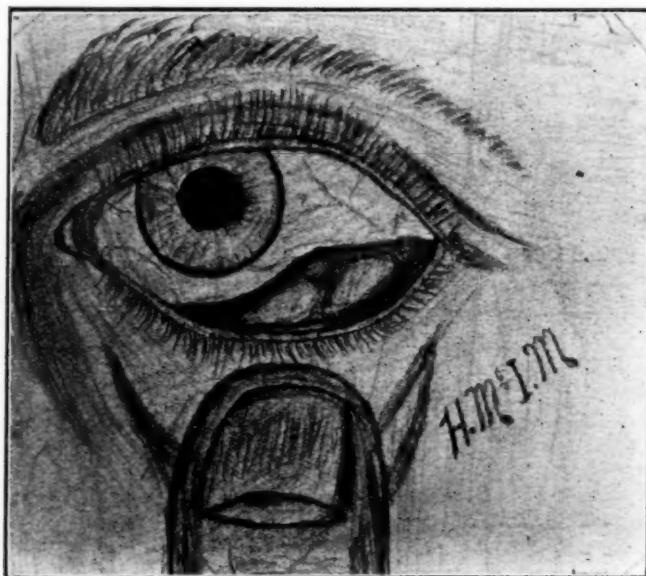


Fig. 1—Tumor-like masses of hyperplastic tissue. (H. McI. Morton.)

after which the edges of the conjunctiva were approximated by silk sutures. Microscopic examination showed simply hyperplasia of the subconjunctival elements.

CASE 3. Miss K. M., white, aged 17, consulted me regarding a disfigurement in the right eye, caused by an immensely hypertrophied plica semilunaris. There was no history of trauma, or of inflammation; otherwise the conjunctiva was normal. The clinical picture presented was that of a large mass involving the plica, and extending to within 1 mm. of the inner corneal limbus, and of a thickness varying from 1.5 to 2.5 mm. She insisted that until one year ago this eye appeared the

eye had become sore, following an injury. He tells me his family physician had removed, at this time, a small foreign body, the exact nature of which he could not state.

The growth occupied a position from the outer limbus corneae to the canthus, under the bulbar conjunctiva, and was reflected over the fornix to the palpebral conjunctiva, almost to the lid margin; and extending over the regions of the accessory lacrimal gland and lacrimal gland proper. It was firm in character, smooth, and attended with very slight, if any, changes in the conjunctival epithelium.

The case was sent to St. Barnabas Hospital, where two linear incisions

were made. These were deep, extending probably to the capsule of Tenon. The case recovered rapidly and by July 1st the eye presented a practically normal appearance.

In reporting his examination of the tissue in this last case, Dr. Kano Ikeda, pathologist of the hospital, states:

"The epithelium shows signs of active hyperplasia, the submucous area shows dense connective tissue cells,

the superficial conjunctiva. The surface of the enlargement is smooth and even, rather than rough and nodular. The process does not extend beyond the subconjunctival tissue and in none of these cases was there involvement of any part of the globe itself or its adnexa. Symptomatically very little is to be elicited, there being no pain or discharge. The accompanying illustrations indicate very well the mani-



Fig. 2—Section of tissue excised from Case 4. A, hyperplastic conjunctival epithelium. B, round cell infiltration. C, blood sinuses.

numerous blood sinuses and collection of inflammatory cells in subepithelial regions. The general microscopic picture is that of local hyperplasia and hypertrophy due to chronic inflammatory reaction." (See Fig. 2).

Clinically considered, we have then, as represented by these cases, a distinct picture of what is possibly a rather unusual eye affection, characterized by rapid hyperplasia and usually following trauma, the process involving, as a rule, the tissue beneath the inferior half of the culdesac, with comparatively little inflammation of

fest character of the affection, both pathologically and clinically.

The limited experience gained from so brief a series of cases renders opinion regarding treatment of not very great value, though it may be suggested that deep incision, in the last and recent case, brought about rapid recovery.

In reporting previously upon this condition, I stated and now repeat, that there are probably many unreported cases, which have probably not been recognized as a distinct type of disease of the conjunctiva.

CONGENITAL ATRESIA OF THE LACRIMAL DUCT.

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Read before Eye, Ear and Nose Section, San Francisco County Med. Society, April, 1919.

With reports of two illustrative cases this paper discusses the practical aspects of congenital lacrimal obstruction.

The condition made the subject of this paper is not of every day occurrence. Still, aside from being of specific interest to the ophthalmologist, it is of practical moment, from the differential diagnostic viewpoint, to the family physician and the obstetrician. The following two histories are offered as typically representative.

1. A healthy baby girl, first born, 10 days old, referred for purulent discharge from left eye. There is moderate irritation of the eye. No swelling over tear sac. On pressing upon the latter a little mucopurulent fluid comes from the lower lacrimal punctum. Examination of pus smear negative. Strong pressure by finger on sac with slight massage of the region once a day on this and the following day are followed by prompt permanent cure. Diagnosis dacryocystitis.

2. V. G., normal first born, boy of 4 months, seen for the first time February 14, 1918, "has always a tear in his left eye since one week old"—to quote his mother's words. Had been treated with eye drops only. Examination shows moderate conjunctivitis of affected eye, no swelling over tear sac. Pressure on the latter brings quite a liberal amount of purulent discharge from lacrimal puncta, much to the surprise of the parents, the examination heretofore having always consisted in mere inspection of the eye. Diagnosis dacryocystitis.

Pressure and massage on sac and application of zinc drops upon the conjunctiva almost daily for a month only tend to temporarily check the secretion, so that parents consented to a general anesthesia on March 13. Repeated attempts to probe the tear duct thru the upper canaliculus proving abortive, the lower canaliculus was slit, and a No. 3 probe passed thru the whole length of

the duct without any difficulty. There was a little pus on pressure the following day. Since then the eye remained normal, the child having been seen frequently up to the present.

It is now generally accepted that dacryocystitis of the new born is due to atresia of the tear duct. Normally open at birth, the duct may still be closed at its nasal end by a thin septum, a fetal residue. Usually this septum becomes atrophic thru being stretched as the canal widens, finally leading to perforation. According to the anatomic studies of 13 fetuses by Mayou¹, the lower end of the lacrimal canal is very narrow thruout the whole fetal period; and remains so at birth, being partly closed at its nasal end by pressure from the lower concha. It is filled at birth with detritus, which is derived from the solid chord of proliferating epithelial cells which formed the original anatomic substratum of the tear passages, and by degeneration of the central cells of which canalization had taken place.

This detritus is ordinarily soon removed by aspiration. If the lumen be particularly narrow aspiration will remain ineffectual and a secondary infection take place. The lack of an open passage may after a time lead to considerable extension of the sac, which, thanks to the elasticity of infantile tissue, will promptly disappear after a removal of the stoppage. Axenfeld² remarks expressly that in some cases it is only after strong pressure with a glass rod that the contents of the sac can be emptied. This, according to Mayou³ is because the sac fills but part of the fossa lacrimalis in the new born; and may therefore become extended to a considerable degree, before swelling will be noticeable externally; secretion will therefore be gathered for a

considerable time and the trouble be discovered only after weeks.

Other possible contributing etiologic factors are blocking of lumen by circular folds of mucosa (valves of Huschke and Hasner), stenosis thru infraction of bones in forceps delivery, also the curved course of the lacrimal duct in the fetus, as against its straight course in the adult. Rochon-Duvigneaud⁴ found anatomically among 30 heads of all fetal stages incomplete nasal opening of the duct three times; and once this condition was bilateral. It is more rare by far that inflammation of the nose or its sinuses will lead to secondary infection of the sac. Diseased bone conditions of the neighborhood, from tuberculous and gummatous processes, also may bring about similar conditions.

The secretion is generally sterile, at first consisting of epithelial cells, detritus and mucus. Later secondary infection will take place, and there is then no longer any real difference from dacryocystitis of later life, the pneumococcus predominating, and staphylococci also common.

The clinical picture of dacryocystitis neonatorum can simulate ophthalmomelorrhea, impressing itself as such on the medical attendants in the first of the histories given above. The only reference I know of, to bilateral occurrence in life is by Seefelder.⁵ There has been described by Peters⁶ and later by Péchin⁷ a persistent form of conjunctivitis in the new born, without any muco-pus from the lacrimal sac. It resists all treatment by instillations, but is promptly cured by pressure upon the sac or otherwise by probing—evidently pointing to closure of the duct as the cause.

It is of practical importance in ophthalmia neonatorum to bear in mind the possibility of secondary infection of the lacrimal passage, if impermeable thru atresia. I, therefore, would advocate an occasional pressure and slight massage of the sac as a routine practice in ophthalmia neonatorum. With a clear passage into the nose the sac does not become infected even in gonorrhoeic or diphtheritic conjunctivitis,

altho inundated with their microbes; hence we must conclude that its mucosa possesses quite different "affinities" or receptors from those of the conjunctiva.⁸ It is more nearly related to the mucous membrane of the nose than to the conjunctiva, may, indeed, be looked upon as a continuation of Schneider's membrane, and the sac thus as a quasiaccessory sinus of the nose—a qualification borne out by its ready involvement in acute rhinitis.

Regarding therapy it would seem best to first try simple pressure, eventually followed by massage; and only in case of not succeeding thus to institute careful probing and perhaps syringing. From some experience in that respect I am inclined to think that in part of the cases at least one would succeed here in probing thru the upper canaliculus (after Otto Becker).

In the light of the almost universally prompt favorable results of our therapeutic measures in congenital affections of the lacrimal sac in the new born, in marked contrast to the situation in later life, one should feel especially reluctant to slit the lower canaliculus for probing.

There may be spontaneous cures, but they are certainly the exceptions, and a case of Bernhardt⁹ shows that the purulent discharge may persist for years if not treated. Expulsion of a pus floccule into the nose immediately preceding cure, has been described in several instances. Groenouw¹⁰ discusses the probable occasional hereditary nature of the trouble. In the first of the histories given above a child of the father's brother is said to have had the same affection.

Atresia of the lacrimal duct is certainly not so rare as one would have been inclined to think formerly. Bernhardt gives 17 cases from the Rostock clinic in six years, and believes there were probably from 6 to 8 more, where the correct diagnosis was made later, but not recorded. I remember especially, whilst house surgeon with Uhthoff, several cases equally as mild as the first of the two recorded here, which were all cured by simple pressure.

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**VISUAL ACUITY AT LOW ILLUMINATION AND THE USE OF THE
ILLUMINATION SCALE FOR THE DETECTION OF SMALL
ERRORS IN REFRACTION.**

PROF. C. E. FERREE AND G. RAND, PH.D.,

BRYN MAWR, PA.

This paper reporting the use of apparatus described in the last number of the JOURNAL brings out some remarkable facts regarding the effect of uncorrected errors of refraction on visual acuity at low illumination and suggests a method of great delicacy for determining the amount and meridians of astigmatism. Presented before the meeting of the American Ophthalmological Society, June 1919.

As was stated in the previous paper (see p. 335) the incentive to this work was a feeling in the Navy of the need to establish a system of testing, for the selection of men for those branches of its service requiring especially keen scotopic acuity. The first step towards the accomplishment of this purpose was of course the devising of a suitable apparatus and test method. A further need, however, was to find out what range of difference in scotopic acuity might be expected among eyes graded as fit on the basis of the tests of other functions and capacities.

We have been interested to make a preliminary survey of eyes graded as normal with regard to photopic acuity and other commonly tested functions in order to determine whether such eyes may be expected to show significant differences in keenness of functioning at low illuminations. This work can, of course, be considered only as preliminary. The final survey and establishment of norms and standards, on which to base the selection, should come thru the testing of a large num-

ber of men in the service of the Navy, or in candidacy for this service.

In a thoro test of ocular fitness for vocations requiring keenness of discrimination at low illuminations, the following points should be taken into account: (1) the minimum amount of light required to discriminate the test object before dark adaptation; (2) the minimum amount after an appropriately selected period of dark adaptation; and (3) the rapidity as well as the amount of gain in acuity during the process of adapting. These points are not only the obvious *a priori* possibilities with regard to individual differences, but they have been confirmed by us in a preliminary survey of a number of normal subjects.

It will be the purpose of this paper to give a brief statement of the results of this survey; also a brief exposition of a new method of using the acuity test in clinic work. That is, in the process of making our acuity tests with a sensitive light control, we have found that the illumination scale can be used with great precision in *detecting small errors in re-*

fraction, and in their correction. This follows rather obviously from the fact that acuity changes slowly with change of illumination, small differences in acuity corresponding, comparatively speaking, to large differences in illumination for all but very low illuminations.

When, therefore, the minimum illumination is determined at which a test object subtending the standard visual angle can just be discriminated, the illumination scale becomes in effect an amplified indicating scale, by means of which the relatively slight differences in acuity, represented by the proper correction of an error in refraction and small deviations therefrom, may be detected with comparative ease and certainty. A useful application of this principle is found, as will be shown later in the paper, in the detection of low astigmatisms and of small errors in the amount and placement of their correction.

RANGE OF ILLUMINATION REQUIRED BY NORMAL EYES FOR DISCRIMINATION OF THE STANDARD TEST OBJECT.

In making these determinations three test objects were used: the Snellen chart and two single test objects which could be rotated into different positions,—the letter E and the broken circle—each subtending a 5-minute angle. The determinations were made at the beginning and end of a 45-minute adaptation period. It is obvious from the preceding discussion that the results at low illumination would be influenced by the refracting conditions of the eye as well as by its power of scotopic vision.

In order to make the results represent as far as possible the difference between scotopic and photopic vision, each eye was refracted and the acuity was taken under 5 foot-candles (53.8 meter-candles) of light. In the first series of tests 22 observers were used ranging from 18 to 28 years of age. Results were obtained for both eyes and for the two eyes separately. Of the eyes used, 75.7 per cent were able to read at 6 meters the test type designed to be read at 4 meters; 13.5 per

cent, at 6 meters the test type designed to be read at 5 meters; and 10.8 per cent, the test type designed to be read at 6 meters. It was our intention throughout the work to use only eyes that could be ranked as Grade A with regard to photopic acuity.

The results of these determinations show a greater range of individual difference for the broken circle than for the Snellen chart or the letter E (905 per cent for the broken circle, 548 per cent for the letter E, and 357 per cent for the Snellen chart). This superior showing for the broken circle is perhaps in accord with the general finding, that the broken circle as a test object picks up smaller differences in acuity than either of the other two test objects employed. These differences, too, it will be remembered, are amplified in the present case by the fact that they are read on the illumination scale and not on a scale which sustains a 1 to 1 relation with acuity. Inasmuch as the greater sensitivity was shown in these preliminary experiments by the broken circle as test object, 15 additional observers were employed using this test object alone.

Space will be taken here only for a brief general statement of the results for this latter series of determinations. (1) The individual differences in the minimum illumination required for the discrimination of the test object, before the period of dark adaptation, fell between 0.70 and 5.29 meter-candles, a range of 656 per cent; after the 45-minute period of dark adaptation, between 0.32 and 2.2 meter-candles, a range of 588 per cent. A greater range of individual difference, it will be noted, was found for the tests taken before the period of dark adaptation, than for those taken after the 45-minute adaptation period. This was doubtless in part due to the lack of careful standardization of the initial sensitivity, by a period of preadaptation to light of a fixed intensity; and in part to individual differences in the amount and rate of adaptation. A careful initial standardization of sensitivity was purposely avoided in this preliminary work with

the apparatus, in order more closely to approximate the rough conditions of testing which are apt to prevail in the selection of men with reference to vocational fitness.

(2) Thus far without exception the two eyes of the same observer have required a different amount of light just to discriminate the test object. The minimum difference in this regard for the 15 observers employed, after the 45-minute adaptation period, was 0.12 meter-candle, 19 per cent of the amount required for the better eye; the maximum difference was 1.50 meter-candles, 53.6 per cent of the amount required for the better eye.

(3) A question is often raised with reference to points of advantage of binocular as compared with monocular seeing. In 6 per cent of the cases tested, the binocular result was equal to or approximated the result for the poorer eye; in 88 per cent of the cases, it was better than the results of either eye; and in the remaining 6 per cent of the cases it was intermediate to the results obtained with the two eyes separately. In none of the cases tested was it equal or approximately equal to the result for the better eye. In the 88 per

cent of cases referred to, less light was required for the discrimination of the test object by the two eyes than by the better eye alone by amounts ranging from 14.5 to 67.3 per cent.

In order to get a rough idea of the grouping of the 15 observers with reference to the minimum amount of light required to meet the standard of acuity imposed by the test, before and after the period of dark adaptation, they have in each case been divided into six equally spaced groups; each group for the work before adaptation covering a range of 1 meter-candle, and for the work after adaptation a range of 0.4 meter-candle. For the tests before adaptation, 13.3 per cent fall in the first or best group, 26.7 per cent in the second group, 20 per cent in the third group, 20 per cent in the fourth group, 13.3 per cent in the fifth group, and 6.7 per cent in the sixth group. For the tests after adaptation 6.7 per cent fall in the first group, 20 per cent in the second group, 40 per cent in the third group, 13.3 per cent in the fourth group, none in the fifth group, and 20 per cent in the sixth group. A graphic representation of this grouping is shown in Fig. 1.

TABLE I.

Showing the amount of light required just to discriminate the test object at the beginning of dark adaptation, and at the end of 15, 30, and 45 minutes (15 observers). In these experiments there was no standardization of the initial sensitivity by a previous adaptation to an illumination of constant intensity.

Observer	Photopic Acuity	Illumination in meter-candles required just to discriminate the test object				Difference in illumination required at beginning and at end of 45 min.	
		Beginning	At end of 15 min.	At end of 30 min.	At end of 45 min.	Meter-candles	Per Cent
G	6/4	0.70	0.55	0.35	0.32	0.38	118.8
M	6/4	1.00	1.00	0.82	0.82	0.18	21.9
Mc	6/4	1.24	1.00	1.00	1.00	0.24	24.0
R	6/4	1.36	0.60	0.50	0.60	0.76	126.7
L	6/4	1.55	1.00	0.88	0.88	0.67	76.1
S	6/4	1.75	1.42	0.88	0.88	0.87	98.9
Th	6/4	2.11	0.82	0.94	0.94	1.17	124.5
Y	6/4	2.11	1.55	1.49	1.42	0.69	48.6
St	6/6	2.40	0.60	0.60	0.60	1.80	300.0
Sw	6/4	3.43	2.17	2.20	2.20	1.23	55.9
K	6/4	3.90	2.81	2.40	2.10	1.80	85.7
T	6/4	3.97	1.18	0.82	0.88	3.09	351.1
Sm	6/4	4.10	3.80	1.40	1.30	2.30	215.4
W	6/6	4.20	1.40	0.76	0.76	3.44	452.6
Ba	6/4	5.29	2.11	2.02	2.11	3.18	150.7

INDIVIDUAL VARIATIONS IN THE AMOUNT
AND RATE OF ADAPTATION IN TERMS
OF EFFECT ON ACUITY.

The preceding experiments furnish data with regard to the minimum amounts of light required to just discriminate the different test objects at the beginning and end of the 45-minute adaptation period. In case of the 15 observers tested with the broken circle in the final series of experiments, at the beginning of dark adaptation and at the end of 15, 30 and 45 minutes, the minimum difference in the amount of light was 0.18 meter candle or 22 per cent of the amount required at the end of the adaptation period; the maximum was 3.44 meter-candles or 452.6

affects acuity, which is the effect of greatest importance to the special work for which the apparatus was devised, and the effect with which we are the most concerned for the greater part of our working lives. A comparison of these results with those of similar series, in which the object is to measure the increase in light sensitivity as a result of dark adaptation, shows that just as acuity increases slowly with increase of illumination, so also does it increase slowly with increase of sensitivity to light. That is, the eye does not gain by adaptation nearly so much in acuity as it gains in light sensitivity.

In Fig. 2 the actual amounts of illumination required just to discrimi-

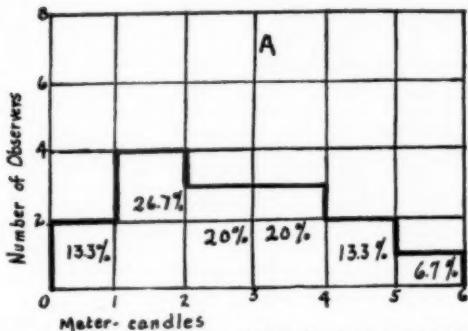
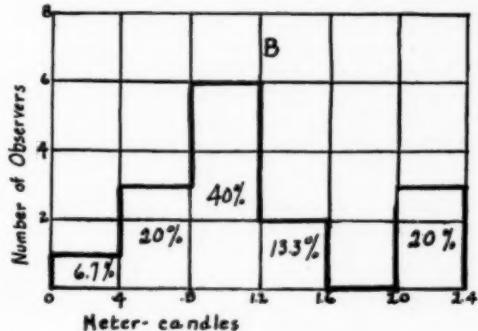


Fig. 1—Representing the relative distribution of 15 observers graded with reference to the minimum illumination required just to discriminate the test object. A, before adaptation; B, after a 45-minute period of dark adaptation.

per cent required at the end of the adaptation period. These results are shown in Table I.

In addition to these experiments a special adaptation series was run, in which the minimum illumination required just to discriminate the test object was determined at the beginning of the adaptation period, and at the end of 5, 10, 15, 25, 35 and 45 minutes. In order to standardize the initial sensitivity of the eyes of the observer, a preadaptation period of 20 minutes was given to 80 foot-candles of light (vertical component), the skylight illumination of an optics room on a medium bright day.

A few of the results obtained are represented in Table II and in Figs. 2 and 3. These results, it will be remembered, represent adaptation only as it



name the test object are plotted against time of adaptation. It thus affords a comparison of the position of the minima of the different observers in the illumination scale; and comprehends data from which the following points can be determined: (a) their relative ranking with regard to scotopic acuity before and after adaptation, (b) their light sensitivity before and after adaptation insofar as it affects the minimum amounts of light required just to discriminate the test object, and (c) their relative amounts of change in sensitivity, measured in terms of effect on acuity, due to adaptation. All of these features are important for vocational and clinical classification.

In order to make these results more directly comparable with reference to

TABLE II.

Showing the amount of light required just to discriminate the test object at the beginning of dark adaptation and at the end of 5, 10, 15, 25, 35 and 45 minutes (6 observers). In these experiments the initial sensitivity was standardized by 20 minutes preadaptation to 80 foot-candles of light (vertical component), the illumination of a skylight optics room on a medium bright day.

Observer	Photopic Acuity	Illumination in Meter-Candles Required Just to Discriminate the Test Object						Difference in Illumination Required at Beginning and at End of 45 min.		
		At End	At End	At End	At End	At End	At End	Meter-Candles	Per Cent	
		Begin-ning min.	of 5 min.	of 10 min.	of 15 min.	of 25 min.	of 35 min.	of 45 min.		
I	6/4	0.55	0.505	0.42	0.35	0.32	0.35	0.35	0.20	27.1
II	6/4	0.705	0.42	0.42	0.32	0.32	0.32	0.38	0.325	85.5
III	6/4	1.06	0.76	0.60	0.46	0.35	0.46	0.46	0.60	130.4
V	6/4	1.12	0.82	0.52	0.32	0.32	0.38	0.38	0.74	194.7
V	6/4	1.62	1.12	0.94	0.55	0.60	0.60	0.55	1.07	194.5
VI	6/4	2.20	1.12	1.14	1.18	1.36	1.24	1.24	0.96	77.4

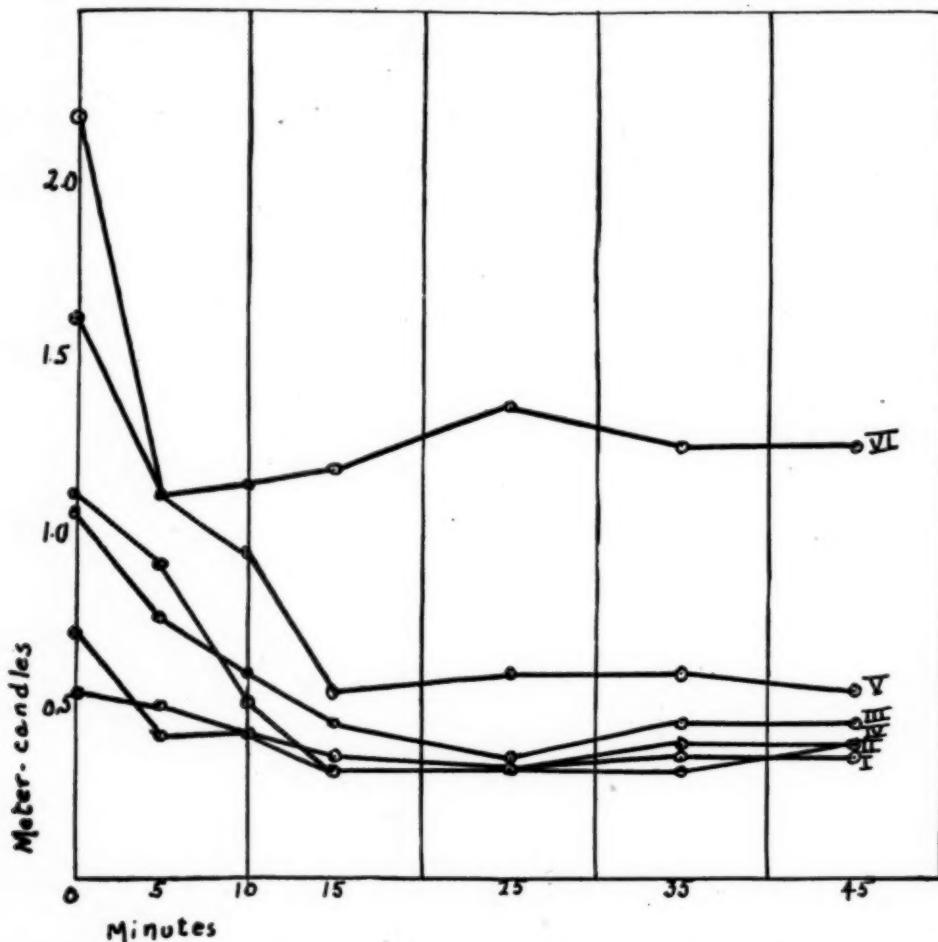


Fig. 2—Curves showing the decrease in the amount of light required just to discriminate the test object as the result of dark adaptation. In order to standardize the initial sensitivity, the eye was preadapted in each case for 20 minutes to 80-foot candles of illumination, vertical component.

the last of these points, namely, the relative amounts of change in sensitivity due to adaptation, the ratios or percentages of increase in sensitivity are plotted in Fig. 3, the reciprocals of the minimum amounts of light required just to discriminate the test ob-

jects themselves. Space will not be taken here for this representation.

It will be noted that the greater part of these observers reach their maximum acuity at the end of 15 minutes adaptation and that some even show

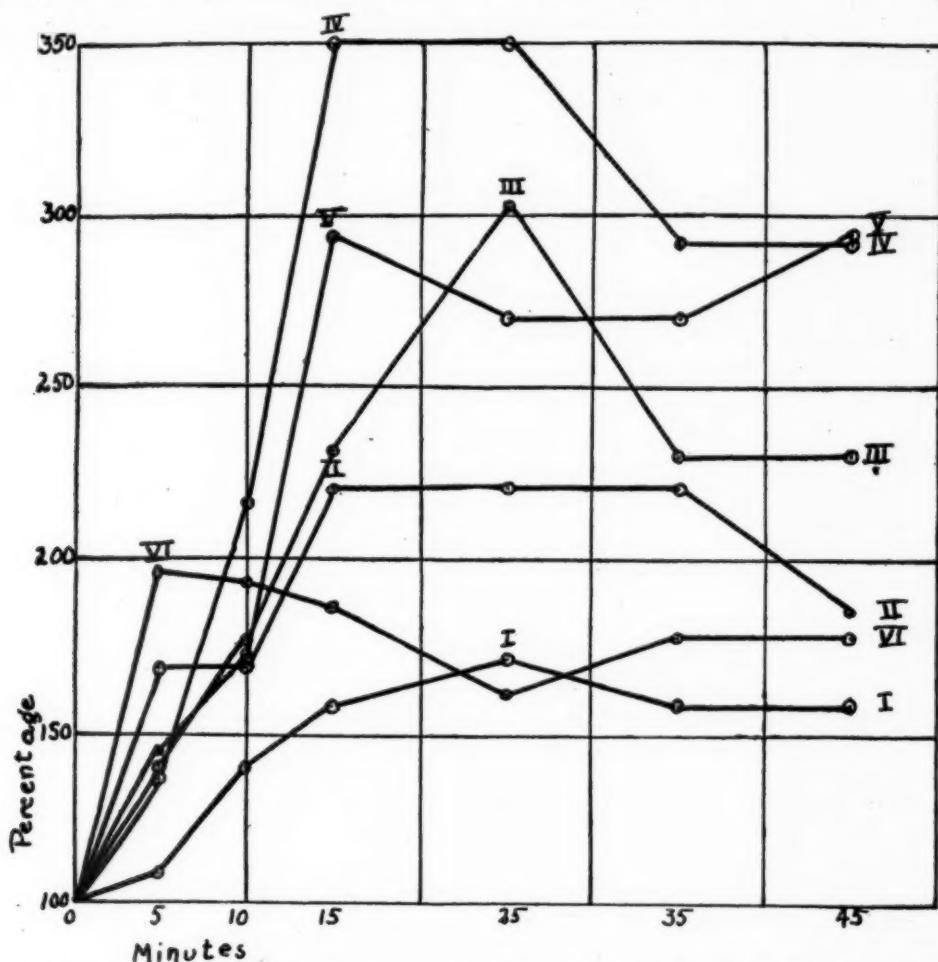


Fig. 3—Curves showing the increase in sensitivity as the result of dark adaptation, the reciprocal of the amount of light required just to discriminate the test object being taken as the measure of sensitivity. Percentage increase in sensitivity is plotted against the time of adaptation. The initial sensitivity of the eye was standardized in each case by 20 minutes of preadaptation to 80-foot candles of light, vertical component.

ject being taken as the measure of sensitivity. That is, the ratio or percentage change in the value of these reciprocals is plotted against time of adaptation, the curves beginning at a common point or unit ratio. The relative rating with regard to the second point could of course be represented by plotting

a lower acuity if the series is continued beyond this time. The loss in their case is doubtless due to fatigue of the muscles of adjustment. That is in case of the observers more susceptible to muscle fatigue, the loss of acuity due to fatigue more than compensates for the small gain in light sen-

sitivity after the first 15-25 minutes. In this connection it may be noted that the strain imposed by taking the acuity at the minimum illumination is much greater than at the illuminations ordinarily used. Even with a 5-10 minute rest period between determinations and a 2 second interval between the individual observations making up one determination, a very noticeable fatigue was present at the end of the 45 minute series.

Sensitivity of the apparatus for detecting small errors in refraction and in their correction.—There are doubtless many ways in which sensitivity can be added to the acuity test for the detection of small errors in refraction and in their correction. In connection with the problems which we have undertaken during the past eight years involving modifications and refinements in functional testing, three principles have come to light which can be used very effectively to this end. That is, the eye which suffers from an insufficient resolving power shows the following functional defects: (1) an undue lag or slowness in making the adjustments needed for clear seeing, (2) a marked loss in power to sustain the adjustments needed for clear seeing, and (3) an increase in the amount of light required just to discriminate details in the standard acuity object.

The devising of test methods based on the first two of these principles has been treated in former papers. The third alone will be considered here. For the purpose of demonstrating its sensitivity as a test principle, low astigmatisms and small errors in the amount and placement of astigmatic corrections have been chosen. Three cases will be considered. (1) Low astigmatisms produced by the use of weak cylinders. In this case the minimum amount of light required to discriminate the test object in the most and least favorable meridians has been determined and at 5, 10 and 45 degrees from the most favorable meridian. (2) Small errors in the amount of the correction. And (3) small errors in the placement of the correction. In these

latter cases, also, in order to know just what the amount and placement of the correction should be, the astigmatism was produced by means of a cylinder of known strength and position, and the amount of illumination required just to discriminate the test object with the true and the false correction was determined.

In choosing to use an artificial astigmatism in this work, it should by no means be understood that we believe that results, with regard to the difference between the minimum amounts of light required for the true and false correction, would be obtained quantitatively identical with those which would be gotten with a natural astigmatism. We are too strongly impressed with the possibility that the astigmatic eye may progressively acquire power to compensate in part for its defect to be of this opinion. The artificial astigmatism was used solely that we might have an exact knowledge of the amount and location of the defect as a check on the determination made by the test. To have knowledge of a natural astigmatism adequate for this purpose would presuppose the supplementary use of a test of equal or greater precision than the one here proposed. We have not as yet been able to develop this precision with the tests already in use.

Sensitivity of apparatus for locating meridian of astigmatism.—It is obvious that if the eye has equal resolving power in all meridians the amount of light required to just discriminate the test object will be the same in all meridians; if the resolving power is not equal, the amount of light required will be different in the different meridians. In Table III it will be noted that in case of an astigmatism produced by a 0.25 diopter cylinder an average result for 5 eyes shows that 107.2 per cent more light was required for the discrimination of the test object in the worst than in the best meridian; at 5 degrees from the best meridian, 50.0 per cent more light was required; at 10 degrees, 95.5 per cent; and at 45 degrees, 107.2 per cent.

TABLE III.
Sensitivity of Apparatus for Locating Meridian of Astigmatism. Astigmatisms produced by 0.25 and 0.75 Diopter Cylinders.

Ob- server	Value of cylinder producing astigmatism	Minimum illumination required for dis- crimination of test object (meter candles)						Difference in result between best and other meridians							
		Best meridian		5° from best meridian		10° from best meridian		45° from best meridian		Worst meridian		Meter candles		Percent	
		5°	10°	5°	10°	5°	10°	5°	10°	5°	10°	5°	10°	45°	Worst meridian
A	0.25	0.60	0.88	1.49	1.62	1.62	1.62	0.28	0.89	1.02	1.02	46.7	148.3	170.0	170.0
B	0.25	1.12	1.75	2.405	2.69	2.69	2.69	0.63	1.285	1.57	1.57	56.3	114.7	131.5	131.5
C	0.25	0.46	0.60	0.76	0.76	0.76	0.76	0.14	0.30	0.30	0.30	30.4	65.2	65.2	65.2
D	0.25	1.42	2.115	2.49	2.49	2.49	2.49	0.695	1.07	1.07	1.07	48.9	75.4	75.4	75.4
E	0.25	1.12	1.88	1.95	2.17	2.17	2.17	0.76	0.83	1.05	1.05	69.9	74.1	93.8	93.8
		Average						0.501	0.875	1.002	1.002	50.4	95.5	107.2	107.2
A	0.75	1.30	2.69	3.05	3.05	3.05	3.05	1.39	1.75	1.75	1.75	106.9	134.6	134.6	134.6
B	0.75	1.81	4.11	4.39	4.39	4.39	4.39	2.30	2.58	2.58	2.58	127.8	142.5	142.5	142.5
C	0.75	0.60	1.75	1.95	2.32	2.32	2.32	1.15	1.35	1.72	1.72	191.7	225.0	286.7	286.7
D	0.75	3.05	6.895	6.985	7.60	7.60	7.60	3.845	3.845	4.55	4.55	126.1	126.1	149.2	149.2
		Average						2.171	2.38	2.65	2.65	138.1	157.1	178.3	178.3

In case of an astigmatism produced by a 0.75 diopter cylinder, 178.3 per cent more light was required in the worst than in the best meridian; at 5 degrees from the best meridian, 138.1 per cent; at 10 degrees, 157.1 per cent; and at 45 degrees, 178.3 per cent.

Doubtless the apparatus can be used in different ways depending upon the experience and preference of the operator. For example, the minimum amount of light required to discriminate the test object could be determined for one meridian and the setting of the light control be held constant while the test object is rotated into different meridians, the observer being

required to judge in each case whether more or less light would be required for its discrimination. This would serve as a rough indication whether or not the eye is astigmatic. The exact meridian of the defect could then be worked down thru a series of settings of the test card and light control. A more feasible method, at least in the more apparent cases, doubtless would be first to determine the region of the defect by means of other tests and use the present apparatus only for the more precise location of the meridian. A feasible method is also to use an astigmatic chart of the radial line or sunburst type, the lines of which are no

TABLE IV.
Sensitivity of Apparatus for Detecting Small Errors in the Placement of the Correction of an Astigmatism.

Observer	Value of cylinder producing astigmatism	Minimum Illumination Required for Discrimination of Test Object			Difference in Result for Correct and Incorrect Placements				
		Exact place- ment of correction	Required 5° dis- placement		Required 10° dis- placement				
			5°	10°	5°	10°	Per Cent		
A	0.25	0.60	1.33	1.62	1.62	13	17	121.7	170.0
B	0.25	1.12	2.25	2.69	2.69	17.5	22	100.9	140.2
C	0.25	0.46	0.60	0.65	0.65	3	4	30.4	41.3
D	0.25	1.42	1.55	1.88	1.88	2	7	9.2	32.4
E	0.25	1.12	1.91	2.17	2.17	12.5	20	70.5	93.8
		Average				9.6	14	0.58	0.86
A	0.75	1.30	2.49	3.05	3.05	17	22	1.19	1.75
B	0.75	1.81	3.43	4.39	4.39	17	22	1.62	2.58
C	0.75	0.60	1.42	2.12	2.12	14	24	0.82	1.52
D	0.75	3.05	6.44	6.44	6.44	20	20	3.39	3.39
		Average				17	22.0	1.75	2.31

more than 5 degrees apart. In this case the procedure would be to reduce the illumination until only one or perhaps two of the lines stand out clearly. This would give a precision, roughly speaking, of about 5 degrees. A more precise result could probably be obtained by featuring three or more of these lines on a rotating dial and turning the dial into the position which gave the sharpest difference between the single line and its neighboring lines.

Sensitivity of the apparatus for detecting small errors in the placement of the correction of astigmatism. In Table IV it will be noted that in case of an astigmatism produced by a 0.25 diopter cylinder, a displacement of the correction 5 degrees from the true position required as an average result for the 5 eyes 66.5 per cent more light than the true placement; and a displacement of 10 degrees, 95.5 per cent more light than the true placement.

ment of the correction of the 0.25 diopter astigmatism, this difference averaged 9.5 for the 5 eyes. That is, since the apparatus can be readily set to half divisions, 19 settings of the light control could have been made with precision between the values needed for the true correction and the 5 degree displacement. This shows that the sensitivity of the apparatus far exceeds the present possibilities of the precise manipulation of the correcting cylinders.

Sensitivity of the apparatus for detecting errors in the amount of correction of an astigmatism. It is obvious that if the astigmatism is fully corrected the same amount of light will be required for the discrimination of the test object in all meridians; if not, an unequal amount will be required in the different meridians.

An average result for the 5 eyes shows (Table V) that in case of an error of 0.12 diopter in the correction,

TABLE V.

Sensitivity of Apparatus for Detecting Errors in the Amount of Correction of an Astigmatism.

Observer	Minimum Illumination Required for Discrimination of Test Object With Different Errors in Amount of Correction						Difference in Minimum Illumination Required to Discriminate Test Object in Most and Least Favorable Meridians					
	0.12 Diopter		0.25 diopter		0.75 diopter		0.12 diopter		0.25 diopter		0.75 diopter	
	Best merid- idian	Worst merid- idian	Best merid- idian	Worst merid- idian	Best merid- idian	Worst merid- idian	Meter Candles	Per Cent	Meter Candles	Per Cent	Meter Candles	Per Cent
A	0.60	0.88	0.60	1.62	1.30	3.05	0.28	46.7	1.02	170.0	1.75	134.6
B	1.12	2.17	1.12	2.69	1.81	4.39	1.05	93.8	1.57	140.2	2.58	142.5
C	0.46	0.65	0.46	0.76	0.60	2.32	0.19	41.3	0.30	65.2	1.72	286.7
D	1.42	1.75	1.42	2.49	3.05	7.60	0.33	23.3	1.07	75.4	4.55	149.2
E	1.12	1.88	1.12	2.17	0.76	67.9	1.05	93.8
					Average		0.52	54.6	1.00	108.9	2.65	178.25

In case of an astigmatism produced by a 0.75 diopter cylinder, a displacement of 5 degrees required 107.2 per cent more light than the true placement; and a displacement of 10 degrees, 160.4 more light. The large number of scale divisions between the correct and incorrect placement of the cylinder will be noted also in this table. In case of the 5 degree displace-

54.6 per cent more light was required in the worst than in the best meridian; in case of a 0.25 diopter error, 108.9 per cent more light was required in the worst meridian; and in case of a 0.75 diopter error, 178.25 per cent more light was required.

In addition to the points already noted, the above results in connection with those of the preceding experi-

ments emphasize the especial need of good resolving power for all work at low illuminations. A small error in refraction or in the amount and placement of its correction is a much more serious handicap at low than at full illumination. A correction, for example, which is adequate for all practical purposes at full illumination would in many cases raise the lower limit of clear vision to such a degree as seri-

ously to disqualify the subject for work at low illuminations. It seems fair to infer too from these results that the individual differences in the amount of light required as a comfortable working minimum, frequently encountered by the illumination specialist, are due to differences in resolving power as well as to differences in retinal capacity.

A STEREOMICROMETER.

CAPTAIN HARVEY J. HOWARD, M.C.,

PEKIN, CHINA.

This is an instrument of precision for measuring stereopsis, or the power of judging differences in distance or depth at the ordinary reading distance. It was worked out at the Medical Research Laboratory, Mineola, N. Y. Authority to publish granted by the Surgeon General's Office. Presented at the American Ophthalmological Society, June, 1919.

Stereoscopic pictures of figures, viewed thru a stereoscope, produce an illusion of solidity or depth, which simulates one of our most common visual experiences, viz., true depth perception. The effect produced is merely an illusion, because in reality the two pictures are in the same reference plane, i. e., there is no difference in distance. The phenomena of depth and depth difference are produced by employing the principle of the binocular parallax. Objects are made to appear relatively nearer or farther away from the observer simply by varying the lateral separation between identical objects or points in the two pictures.

While working upon the subject of judgment of distance with an apparatus employed at a distance of six meters (See A. J. O., v. 2, p. 656), one of my co-workers, Captain Percy W. Cobb, suggested that I adopt the same form of test objects in a hand stereoscopic instrument of precision, for the purpose of producing any degree of depth illusion desired. In the six meter apparatus two black rods with a light surface background were viewed thru the window of a box, the purpose being to learn the smallest depth dif-

ference discernible by different individuals. The binocular parallax was found to be the essential factor in the resultant determinations. The respective depth judgment ability of individuals was reckoned according to their minimal binocular parallactic angles, which were computed from interpupillary distances and depth difference thresholds.

In the hand stereoscopic instrument suggested there would be two pairs of vertical lines or objects to be fused. To produce a sense of depth, the only other essential would be to effect a different lateral separation between the pairs of fused objects, i. e., the binocular parallax would be applied directly and not indirectly as is the case with the nonfused objects of the six meter apparatus.

In addition to Captain Cobb, I am indebted to Mr. Max Poser of the Bausch and Lomb Optical Company for valuable suggestions in formulating the final plans for the instrument.*

* Authority to make according to specifications granted February, 1919 to the Bausch and Lomb Optical Company by the Supply Department, Hazelhurst Field, Mineola, Long Island, N. Y.

DESCRIPTION OF THE INSTRUMENT.

Figure 1 represents a photograph of the completed instrument. Roughly it is about nine inches high, six inches wide and five inches deep.

Figure 2 shows the hood and the box containing the four test objects which are small wires tightly drawn and

comparable. The lenses (Fig. 3) are as carefully made and adjusted as are those in a pair of field binoculars. Each lens has a focal length of 137.5 mm.

At the right side of the instrument is a micrometer screw which has a lateral movement of exactly 0.5 mm

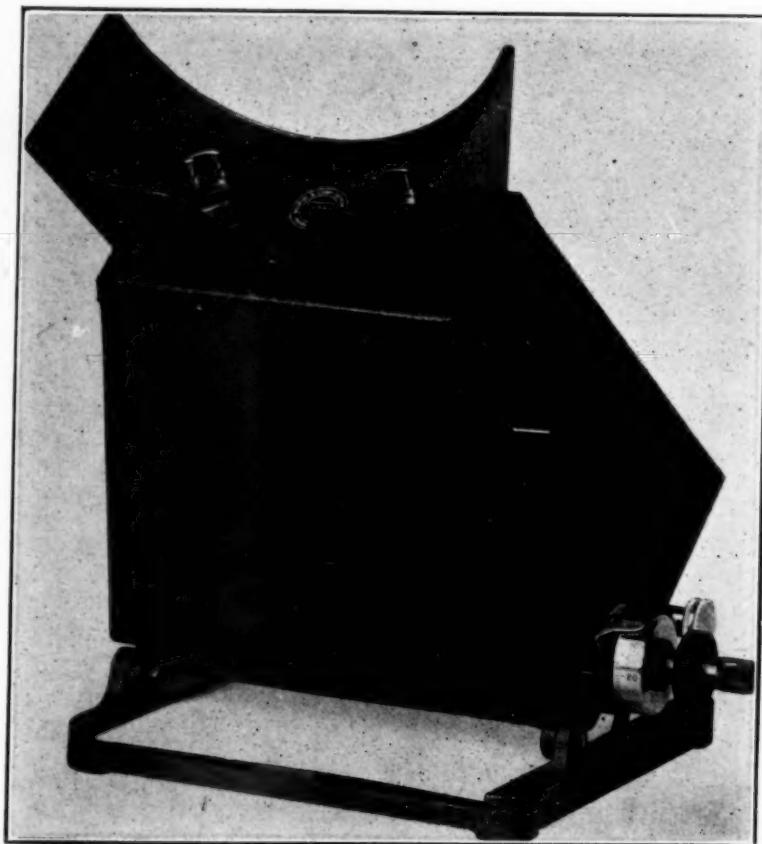


Fig. 1—Howard's Stereomicrometer, complete instrument.

enamelled black. The pair of wires on each side in the completed instrument are 1.375 mm. apart which gives them an angular separation from the center of the lens of exactly one centrad. This angle was decided upon because in experiments with an apparatus at six meters and another at 100 meters, the centrad separation of the test objects had always been used. From this standpoint therefore the results of all three forms of apparatus should be

for each revolution. Attached to the axis of the screw is a drum, with its peripheral surface marked off into 100 equal parts. Each division on this scale represents a lateral shift of the screw of 0.005 mm. Attached to the axis of the screw there is also a double turning knob. Fixed in a horizontal position at right angles to the drum is a metal plate marked off into a 0.5 millimeter scale. Within the box (Figure 6) the micrometer screw

butts firmly against the long end of a lever. With a leverage of five to one, the short end is attached to a bar which holds in position the right hand wire. To take up all slack and lost motion a spring is fixed, one end to the movable bar and the other end to a position inside the instrument. The other three wires are maintained independently of the fourth and in fixed positions. The effect of the "five to one" leverage is to reduce the lateral movement, transmitted thru the micrometer screw to the right hand wire, to one-fifth that of the screw. One division therefore on the micrometer scale represents a lateral movement of that wire of 0.001 mm. or one micron.

Attached to the bottom of the metal stereoscopic box is a base plate of metal upon which the box can be tilted and fixed by a set screw in any position from 90° to 180° . In the upper edge of the base plate is set an opaque milk glass to give an indirect uniform light background for the wires above it.

Behind the lenses is a shutter, which is attached to a wire lever protruding thru the upper right hand side of the box. By manipulating the wire lever the examiner, or the subject himself, is able to produce practically an instantaneous view of the wires, which effect was found to be so valuable in the experiments of the six meter apparatus.

MATHEMATICAL PRINCIPLES INVOLVED IN THE USE OF THE INSTRUMENT.

Let p = interpupillary distance of lenses;

and m = the binocular parallax produced by turning the micrometer screw;

and d = the focal length of the lenses, or the distance to the apparently nearer wire;

and D = the imaginary distance to the apparently farther wire.

Angle 1 — angle 2 = angle 3, the binocular parallactic angle.

For any small angle, like angles 1, 2 and 3, the tangent and the angle in radians are practically equal with negligible error.

Then $\tan \text{angle } 3 = r$ (angle in radians)

But $\tan \text{angle } 3 = m/d$

then $r = m/d$

or $m = rd$

If for example we let the binocular parallactic angle (3) = 1° then 1° in radians = 0.01746 (which is an established mathematical equation). If also $d = 137.5$ mm. the focal length of the lens, then $m = rd = 0.01746 \times 137.5 = 2.4$ mm. If 2.4 mm. therefore represents the binocular parallax when we know the focal distance of the lens to be 137.5 mm. and the binocular parallactic angle to be 1° , we can readily tabulate binocular parallactic measurements representing any number of binocular parallactic angles desired, as

$1^\circ = 2.4$ mm.

$1' = 0.04$ mm.

$1'' = 0.00066$ mm.

$1.5'' = 0.001$ mm.

But it was planned that one division on the stereomicrometer scale would represent a lateral movement of the right hand wire of 0.001 mm. Therefore each division on the scale also represents a binocular parallactic angle of $1.5''$.

When the distance to the apparently nearer wire and the binocular parallax from the reading on the scale are known, then the formula $r = m/d$ may be applied directly, e. g., when

$m = 0.001$ mm. then by substitution

$r = .001/137.5 = 0.00000727$

But 0.00000727 radian = $1.5''$.

If again we desire to know the apparent depth difference ($D-d$) represented by any binocular parallactic measurement which is read off directly in microns from the micrometer scale the results are computed as follows:

$\tan \text{angle } 1 = p/d$

$\tan \text{angle } 2 = m/d$

$\tan \text{angle } 3 = p/D$

then $p/D = p/d - m/d = p-m/d$

or $D/p = d/p-m$

and $D = pd/p-m$

But $p = 64$ mm. and $d = 137.5$ mm.

If $m = 2.4$ mm. (the parallax of a binocular parallactic angle of 1°) then by substitution $D = 64 \times 137.5/64 - 2.4 = 142.85$

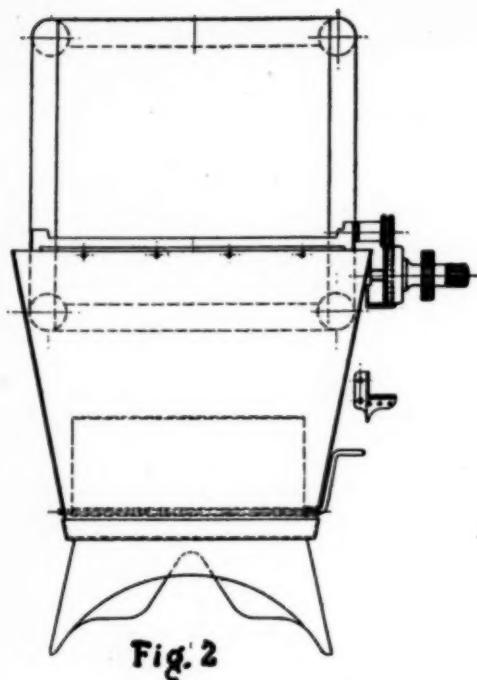


Fig. 2

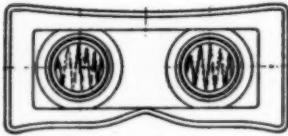


Fig. 3

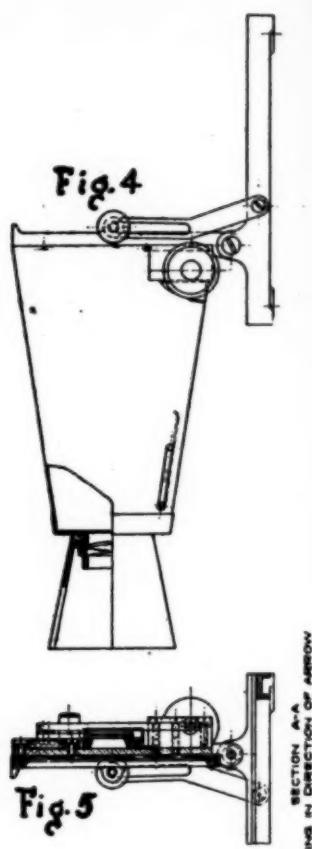


Fig. 4

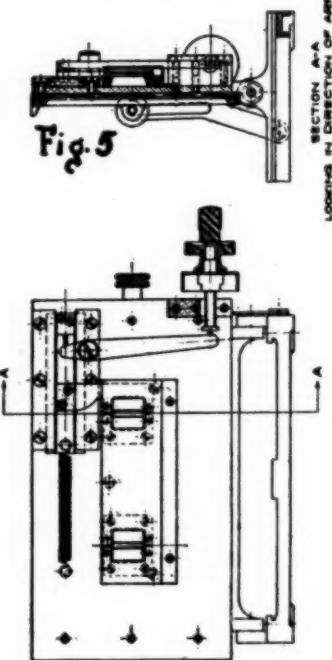


Fig. 5

SECTION A-A
LOCATED IN DIRECTION OF ARROW

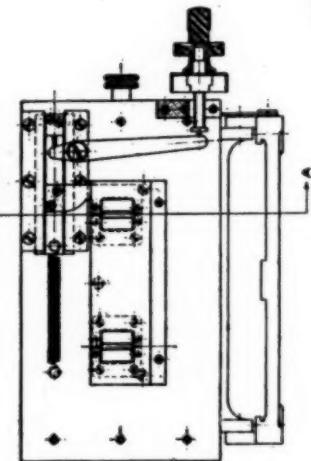


Fig. 6

Diagrams of details of stereomicrometer.

and $D-d = 142.85 - 137.5 = 5.35$ mm.

When $m = 0.04$ mm. (the parallax of a binocular parallactic angle of $1'$) then by a similar method of computation $D-d = 0.084$ mm.

When $m = 0.01$ mm. (the parallax of a binocular parallactic angle of $15''$) then $D-d = 0.0215$ mm.

When $m = 0.001$ mm. (the parallax of a binocular parallactic angle of $1.5''$) then $D-d = 0.00215$ mm.

CONCLUSIONS: The test is made by requiring the subject to set the wires into what he thinks is the same reference plane, i. e., equidistant from his eyes. After a number of such trials the average error represents his binocular parallactic angle threshold. This threshold is computed in seconds by adding 50% to the reading on the scale representing his average error. For example, if the scale reading is 10 divisions from the zero mark, then his minimal binocular parallactic angle is $15''$. With such an instrument it is possible to classify individuals according to their respective degree of stereopsis. With those who have the ability of fusing stereoscopic objects, e. g., nearly all those having binocular single vision, this classification should represent their respective ability to judge

distance. This instrument should offer a far more satisfactory test of stereoscopic vision than the ordinary hand stereoscope which has been used almost universally in testing candidates for aviation service.

The instrument perhaps offers a more direct application in testing and classifying candidates for the naval and artillery services, where according to recent communications the men may be required to use stereoscopic range finders. During the war it was known that the central powers used stereoscopic range finders almost exclusively. The entente powers on the other hand used various forms of coincidence range finders, but towards the end of the war the U. S. authorized the manufacture in this country of a number of stereoscopic range finders. The comparative results with the two forms of range finders will depend very largely upon the selection of the men using them. By means of the stereomicrometer it should be possible to select only those who possess the highest degree of stereopsis or judgment of distance. This group should show such a remarkable ability with the stereoscopic range finder that its use may eventually be adopted in place of the ordinary coincidence type.

A FIELD INVESTIGATION OF THE ETIOLOGY OF TRACHOMA IN EASTERN KENTUCKY.

F. B. EATON, M.D.,

SAN FRANCISCO.

This report of the results of the study of the actual conditions bearings on the etiology of trachoma is published by permission of the Surgeon General of the Public Health Service. It includes a survey of the literature and present status of the subject, reaching the conclusion that the most potent cause of trachoma is interhuman contagion.

Following a report to the Surgeon General of the U. S. Public Health Service in August, 1918, of my investigations in California (and previously in Oregon), which apparently demonstrated the existence of an animal scar-tissue conjunctivitis of insect origin, etiologically related to trachoma, and affording a working hypothesis, in June, 1919, I was reappointed acting assistant surgeon and ordered to continue the same work in eastern Kentucky and other portions of the Appalachian region.

The report of 1918 was substantially incorporated in an article published in the February, 1919, issue of this journal.

Proceeding to Lexington, Ky., early in July, necessary arrangements were made thru Surgeon John McMullen in charge of the trachoma work of the Public Health Service, with the staff of the Agricultural Experiment Station of the University of Kentucky, and I then proceeded first to the U. S. Trachoma Hospital at Jackson, Brethitt county, Ky.

The articles of Dr. J. A. Stucky, Surgeon McMullen, Dr. Park Lewis, and others have rendered familiar the social habits and customs of the Kentucky highlanders, and their sad affliction from trachoma.

The narrative of my experiences among these people will therefore be concise and brief; my main purpose being to draw attention to certain facts which have led me to reverse my former views concerning the existence of an ectogenous source of the trachoma virus; this change of view being largely the result, however, of my work in Kentucky.

Every element and all conditions favorable to the investigation of a possible relation of animals and insects to trachoma, are present in the mountain region of Kentucky: An infected population, the majority of which possesses horses indispensable for transit in a roadless country; and with which men, women and children are in daily contact; dogs in nearly every home; and, in the timber, an abundant fauna of biting tabanidae.

My procedure in Brethitt county, as in other localities, included examining and questioning patients at the trachoma hospitals, citizens, farmers and local veterinarians, and examination of the conjunctivae of horses. In addition I made horseback trips for some distance along the many creeks, interviewing the natives, visiting them in their homes and examining the eyes of their horses, and secured specimens of the four species of tabanidae infesting animals thruout the whole mountain region of Kentucky and Virginia.

These were properly prepared for microscopic examination. Nevertheless, in Brethitt county I found only one case suggestive of equine folliculosis; no scar tissue was found.

There were difficulties. It was not possible to examine horses *ad libitum*; the owners had to be consulted. Here an obstacle was encountered in the fact that the Kentucky mountaineer is, by instinct and training, a born horse dealer who invariably conceals, if possible, any eye affection of his horses, and as invariably seeks by trade to get rid of a seriously affected animal. An element of uncertainty too, was the uniform unreliability of verbal lay evidence. With the exception of one

native who stoutly asserted that with the assistance of an educated physician, he had turned the eyelids of one of his horses and seen palpebral and ocular conjunctiva granulations which the physician declared were identical with those of trachoma, and the statement of two mountaineers who claimed to have turned the lids and seen "granulations" in numbers of horses, I uncovered no evidence that seemed reliable from this source in Brethitt county; nor from veterinarian sources. The evidence, so far, was wholly negative.

After a month of work in Brethitt county, I proceeded to Pikeville, in extreme eastern Kentucky. In Pike, and the adjoining counties, trachoma is very prevalent. Dr. R. W. Raynor, for five years in charge of the U. S. Trachoma Hospital at Pikeville, dissented decidedly from the theory of equine conjunctivitis as a trachoma factor, stating that he had visited the native homes in Pike county extensively and had found the newer cases so grouped about single, old cases, as to convince him that the latter were foci originating the former, and that the disease spreads in the mountains solely by interhuman contagion.

The local veterinary, a highly educated, intelligent graduate with an extensive practice, gave me reliable and valuable information of the animal conditions of the region. He had never seen follicular conjunctivitis in horses, tho as a routine he examined the conjunctiva, and for four years he had vigilantly looked for it, and also for equine trachoma because of the disease among the people. The poorer mountain folk from far up the creeks brought their horses to him as frequently as those near by, but follicular disease was not found. I have no hesitation in stating that equine follicular conjunctivitis does not exist in Pike, and neighboring counties, or is exceedingly rare.

In fact, my findings in Brethitt and Pike counties now appeared to me to be typical of the whole mountain region, and I turned my attention to other etiologic indications, such as the predominant rural prevalence of

trachoma, climate, soil, etc., and above all to the attainment of a broader view of the disease as a world malady, presumably manifesting characteristics varying with its regional distribution. In other words, to its natural history.

As forty per cent of all dogs have conjunctival folliculosis (Fröhner), and entropion and other lid complications are far more frequent among them than horses, in September I proceeded to Lee county, a region once severely infected with trachoma, and still infected. There, on horseback (on two creeks), I visited eighteen homes; and in these homes carefully examined the conjunctivae of twenty-two dogs' eyes. Sixty per cent showed marked hyperemia, with slight swelling of the retro-tarsal folds, amounting in 20 per cent approximately to chronic conjunctivitis of mild grade, and exhibiting the folds beaded sparsely with moderate-sized follicles; secretion mild and mucoid. No scar tissue was found. All these eyes appeared normal externally. During these visits I saw chickens and turkeys walking about in the houses. I also learned that the trachomatous eyes of persons who fall asleep during the day time, especially children, are infested with feeding house-flies.

The conjunctival conditions in dogs were so trivial as to warrant the conclusion that in that region where trachoma has long been endemic, the eyes of dogs bear no relation to it; and in that respect are identical with those of other parts of the state, as observed by myself and veterinarians, and also in California in 1918. In California I have seen severe canine follicular conjunctivitis (without scar tissue) where trachoma is unheard of; where conditions were favorable to contagion to human eyes, yet it did not occur. I now brought my investigation to an abrupt end.

The work, involving as it did an unheard-of but plausible connection between the eye afflictions of familiar domestic animals, and an ubiquitous disease that had scourged nearly every home in their midst, so appealed to the imagination of the mountain people,

that it was necessary to repeatedly impress upon them the utter lack of proof of such connection; that animals' eyes could not be excluded with certainty as causes save by examining them; and to warn them to fear their neighbors, not their animals; especially their visitors and over-night guests, who, using their soap, towel and basin, might plant the disease in the family, only to be discovered long after and then attributed to some other and fancied agency.

The investigation was neither extensive, nor, measured by scientific standards of thoroughness, exhaustive. It simply excludes by negative evidence, in a limited area, the agency of animals and insects, at a time when certain infectious diseases have been proved to have such origin, and the plausibility of a like origin for trachoma therefore has been enhanced.

Strictly speaking, the results are true only for the highlands of Kentucky. More extensive research in other regions might establish a relation between insects, animals and trachoma, since it has been stated and quoted by Boldt that there is much eye disease in horses, oxen, sheep and dogs on the Lower Nile.

It is believed, however, that the investigation not only demonstrates a negative condition, but also bears out the statement of Passed Asst. Surgeon J. W. Schereschewsky (now Asst. Surgeon General), of the Public Health Service, in 1907, that, "endemic for a number of years in certain restricted areas of southern Illinois, the mountains of Kentucky and West Virginia, * * * the evidence is all in favor of the supposition that it (trachoma) did not originate in these areas, but was due to importation, and, by reason of the comparative poverty and lack of medical facilities prevailing in these sections, was able to become firmly domiciled there."

It may be added that the conditions in the Kentucky highlands also afford a perfectly typical illustration of Boldt's observation that, "All experts are agreed that the endemic form of trachoma appears chiefly and primarily

as a disease of families," and that, "the family is the main channel for its spread, and to a certain extent the incubator of the virus."

Undoubtedly the well known unsanitary habits and social customs of the mountaineers of Kentucky are by far the most potent, and probably the sole, causes of trachoma both as regards its prevalence and dissemination.

PRESENT STATUS OF TRACHOMA IN SOUTHERN ILLINOIS. In 1901, Dr. W. H. Wilder, thru statistics of the Illinois Eye and Ear Infirmary at Chicago, found that by far the greatest number of trachoma cases at that institution came from the southeastern counties, especially those bordering the Wabash river; and claimed that the disease in Illinois is distinctly a rural one and comparatively infrequent at the centers of population.

Being unable to visit Illinois, by correspondence with oculists in a number of these counties, I have obtained data which collectively clearly indicate that in the past fifteen or twenty years, to quote one writer, "the disease, formerly prevalent thru the insanitary conditions of the homes, and ignorance of the people, * * * has largely disappeared owing to better educated and more cleanly and thrifty people."

Another states, "In Lawrence county the disease is, with us, almost a thing of the past. We once (probably 20 years ago), had many cases here. The country people were the ones most frequently affected. Now, we see many sequelae of the disease; entropion, corneal opacities, etc., * * * but almost entirely among the old people (fifty years, or older). * * * It is the consensus of opinion that the common towel, basin, etc., are the means by which infection is transmitted. Years ago entire families were infected in this way."

Dr. E. E. Edmonson, of Mt. Vernon, Ill., writes: "I have to impeach the towel and wash basin as carriers, * * * the fogs and drizzling rains render the towel a potent carrier of the disease, and the dust of the highways in summer is a possible carrier, or, at

least, an irritant, and thereby fertilizes the field for the reception of the virus."

The testimony of these correspondents is unanimous, and convinces me that in southern Illinois, as in Kentucky, the outstanding causes are the ignorance and insanitary habits of the rural inhabitants, and that climate, soil, etc., are but contributary causes. There appears to be no other cause for the rural prevalence than those here given.

I was now ordered to Washington City with instructions to consult records, data and literature regarding the etiology of trachoma. This work was prosecuted mainly at the Hygienic Laboratory, and the library of the Surgeon General of the Army. A limit of time being fixed for the completion of the reports, the work was confined to seeking data concerning the geographic distribution and manifestations of trachoma as reported in the literature since 1913. It is needless to state that bacteriologists have virtually thrown up their hands in despair of finding the specific microorganism.

A comprehensive definition of the word "etiology" implies that the specific cause of a disease is potent,—a cause only,—when and where the conditions, sources and agencies essential to its existence, reproduction, dissemination, and entrance to the human body, are present; also, that these conditions, sources, etc., are themselves causes, and necessary data for a complete demonstration of the etiology of that disease.

Thus limited, a diligent search of all the literature of trachoma since 1913 was conducted. It is unnecessary to detail the results. The etiologic factors adduced by writers in all parts of the world vary from climate, soil, living habits, etc., to nasal disease, and to this writer appear collectively, provincial, partial and lacking in intelligent discrimination. The old tendency to emphasize the influence of climate as against immigrant and importation, and sanitation, is very evident. In short, nothing was found serving to advance the knowledge of the etiology of trachoma

a single step beyond the point reached by Boldt in his classic work.

In contrast to these barren literary gleanings, stand the contributions of the trachoma experts of the Public Health Service, which the writer has studied with some care. It is in no spirit of sentimental self-disparagement, or as assuming the role of apologist for his ophthalmic colleagues in civil life; or yet to indulge in fulsome commendation, that the writer takes this opportunity to express a sincere appreciation of the breadth of view, restraint of statement and scientific sanity and caution which characterize the reports and literary contributions of the personnel of the Public Health Service. These are, of course, the natural results of the exceptional and world-wide opportunities afforded the officers for observation; and of the organization, discipline and *esprit* of the service. On the other hand, some civil writers appear to be either subjects of an euphoric enthusiasm with its resulting *mania scribendi*, or possessed of a too limited equipment of knowledge concerning the life and development of microorganisms in animals and man.

No better illustration of the last is afforded than by the writer in seeking to establish an ectogenous source of trachoma.

And for the following reasons: There is not yet the slightest evidence that the trachoma virus has an ectogenous existence. On the contrary, the writer now knows that some bacteriologic pathologists of repute, in regard to the mutation of microorganisms, advance a working hypothesis that specific microorganisms presumably once possessed of an ectogenous existence, after gaining entrance to the human body, and after a long lapse of time, lose their ability to exist outside of it,—i. e., become endogenous. A knowledge of this view alone would, or should have, deterred the writer from hasty generalization, and a premature announcement of his theory.

All the known properties of the trachoma virus, notably its low vitality and inability to withstand drying at 32 degrees C. for one hour, render it highly

improbable that it has any other than an endogenous existence, and as highly probable that its sole habitat is the human conjunctiva. Indeed it is logical to conclude that such a line of investigation as was pursued in the past by the writer in seeking an ectogenous source in Nature, is foredoomed to failure. The known facts controlling the dissemination and prevalence of trachoma point to the same conclusion.

There is some clinical evidence favoring the existence of a conjunctival affection in animals analogous to trachoma, but proof of this is wanting. Even if this were established, its transmissibility to man would remain in question.

CONCLUSIONS.

1. Outside the laboratory, and excepting the causes controlling the dissemination and prevalence of trachoma, no facts were found in medical literature substantially advancing the knowledge of its etiology since 1914.

2. Climate, soil, dust and individual predisposition, are subsidiary and contributory causes of trachoma. Some climates, to an uncertain and limited extent, appear to attenuate the virulence and diminish the contagiousness and transmissibility of the disease.

3. There is no evidence that the trachoma virus has an ectogenous existence. All its known properties, and the conditions attending its dissemination and prevalence, indicate that it is endogenous to the human conjunctiva, and that that is its sole habitat.

4. There is some evidence indicating the existence of a conjunctival affection in animals analogous to trachoma, but it is inconclusive; and if existent, its transmissibility to man is, according to the teaching and precedents of bacteriological pathology, improbable.

5. By far the most potent known cause of trachoma, is interhuman contagion, due to insanitary habits and social customs.

OPHTHALMIC SERVICE OF A DIVISION OF THE BELGIAN ARMY IN THE FIELD.

MARCEL DANIS, M.D.,

BRUSSELS, BELGIUM.

This account of the organization and work of ophthalmologists in the Belgian Army may be compared with those of the American Expeditionary Forces (see vol. 2, pp. 319, 500, 565; v. 3, p. 343). Translated by M. W. Tredick.

The trench warfare, and its long duration, prompted the Director General of Medical Services to establish services in the specialties, in all the hospitals at the front and at the rear, as well as in the sanitary formations accompanying the army in the field. Every army division has one or more divisional infirmaries, situated, as a rule, in the center of the cantonments, where they occupy barracks specially constructed for their purpose, or the large structures such as schools, theaters, assembly halls, convents, etc.

To these sanitary formations the regimental physicians send the sick and slightly wounded; here also the specialists in oto-rhino-laryngology, syphilology, urology, ophthalmology, stomatology, etc., are consulted. Here, also, treatment is given those who are being treated in the infirmary and those whose condition does not require hospitalization.

The consulting room of the oculist does not shine with the luxury and comfort of a modern installation; a small room with a window and shutter replaces the elegant installations of La Panne and Beveren. The correction of errors of refraction is a large part of the daily work of the divisional oculist and is of capital importance from a practical point of view.

Our outfit always included a large stock of ordinary spectacles with spherical lenses. The correction of astigmatics presented great difficulties, both on account of the great number of possible combinations, as well as on account of the inclination of the axes. Our excellent colleague, Professor Weekers, solved the problem with ease by adopting a frame with round cells, in which the lenses can be turned to any axis desired.

His choice of lenses was the following:

Cylinders: +1, +1.5, +2, +3.
Cylinders: -1, -1.5, -2, -3.
Cylinder +1, with spherical +1, +2, +3.
Cylinder +1.5 with spherical +1, +2, +3.
Cylinder +2 with sph. +1, +2, +3.
Cylinder +3 with sph. +1, +2, +3.
Cylinder -1 with sph. -1, -1.5, -2, -3, -4.
Cylinder -1 with sph. -1, -1.5, -2, -3, -4.
Cylinder -1.5 with sph. -1.5, -2, -3, -4.
Cylinder -2 with sph. -1, -1.5, -2, -3, -4.
Cylinder -3, with sph. -1, -1.5, -2, -3, -4.
Spherical +1 with cyl. -2, -3, -4.
Spherical +2 with cyl. -3, -4, -5.
Spherical +3 with cyl. -4, -5, -6.

This collection was amply sufficient for all ordinary purposes, and the lenses could be delivered to the soldiers on the spot, instead of making them wait a whole month as in the French army.

The soldier receives at the same time a ticket showing his error of refraction, his correction, and his visual acuity. This ticket makes replacement easy, in case of loss or breakage. Besides, the physician of the corps can easily ascertain the visual acuity of the men with reduced vision and have them placed in positions where perfect vision is not called for. With an oculist at the front the number of days on the sick list can be materially reduced; and many can be kept in the regiments who would otherwise have to be sent to the rear. The following is a list of the afflictions treated in the Fifth Army Division during a period of six months:

	LIDS.
Wounds	7
Contusions	12
Eczema	2

Blepharitis	22	Tabetic atrophy	1
Chalazion	27	Detachment of the retina.....	1.
Stye	40	AFFECTIONS OF GLOBE.	
Cyst	3	Contusions	4
Cicatricial trichiasis	3.	Wounds	5.
AFFECTIONS OF LACRIMAL APPARATUS.		TROUBLES OF MUSCULAR APPARATUS.	
Dacryocystitis	4	Convergent strabismus	6
Dacryoindentitis	1	Divergent strabismus	3
Obstruction of the tear passages...	20	Muscular paresis	3
Congenital anomaly	1.	Nystagmus	2
AFFECTIONS OF THE CONJUNCTIVA.		Muscular insufficiency	7.
Acute catarrhal conjunctivitis....	52	MISCELLANEOUS.	
Subacute and chronic conjunc- tivitis	136	Daltonism	1
Phlyctenular Conjunctivitis and kerato-conjunctivitis	19	Hemeralopia	50.
Trachomatous conjunctivitis	6	ERRORS OF REFRACTION.	
Vernal conjunctivitis	1	Myopia	129
Traumatic conjunctivitis	26	Hypermetropia	121
Self-inflicted conjunctivitis	15.	Simple myopic astigmatism	24
Conjunctivitis due to gas (quiet stage)	10	Simple hypermetropic astigmatism	27
Conjunctival ecchymoses	10	Compound myopic astigmatism...	36
Conjunctival adhesions	2	Compound hypermetropic astig- matism	16
Pterygium	5	Mixed astigmatism	16
Wound of the conjunctiva.....	1.	Irregular astigmatism	2
AFFECTIONS OF CORNEA.		Presbyopia	29
Ulcerating keratitis	2	Amblyopia ex anopsia	6.
Interstitial keratitis	1		
Foreign body in the cornea.....	53		
Opacities, nebulae, leucoma	14.		
AFFECTIONS OF IRIS.			
Chronic iritis with posterior syn- echiae	2		
Acute iritis	6		
Iridocyclitis	1		
Heterochromia of the iris.....	1		
Iridodialysis	1		
Pupillary disturbances (tabes)....	5.		
AFFECTIONS OF CRYSTALLINE LENS.			
Operative aphakia	1		
Opacities of the lens.....	4.		
AFFECTIONS OF VITREOUS BODY.			
Old hemorrhages	2		
Recent hemorrhages	1.		
AFFECTIONS OF CHOROID.			
Tears	2		
Myopic choroiditis	9		
Traumatic choroiditis	1.		
AFFECTIONS OF THE SCLERA.			
Episcleritis	2.		
AFFECTIONS OF RETINA AND OPTIC NERVE.			
Opaque nerve fibres	3		
Syphilitic optic neuritis	1		
Posttraumatic atrophy	1		

The oculist is frequently called upon to determine the degree of service ability, in soldiers who claim to be disqualified. Often, again, the oculist is asked to pass judgment on soldiers accused of military offences and claiming defective vision or ocular trouble as an excuse. Soldiers in certain arms of the service, such as chauffeurs, aviators, signal corps members, are required to have normal vision, and here, again, it devolves upon the oculist to examine the candidates for these special services. An ophthalmologic service in each army division is therefore of great value, if not indispensable. It makes possible the early treatment of the wounded, and does away with the sending of a large number of men to the rear for treatment, choice of lenses, or expert opinion. It would add greatly to the efficiency of ophthalmologic, as well as of all the other specialties, if a wagon especially fitted for the specialist's needs, fitted with all the necessary instruments, were a part of each mobile army division. In this way the soldier would receive the benefit of the services of a specialist, to which he is entitled.

AN OPERATION FOR KERATOCONUS WITH REPORT OF TWO CASES

A. S. GREEN, M.D., AND L. D. GREEN, M.D.

SAN FRANCISCO, CALIFORNIA

The operation here described and figured is a modification of the Lagrange operation for glaucoma. Read before the American Academy of Ophthalmology and Otolaryngology, October 17, 1919.

Of the various pathologic conditions of the eye for which operative procedures have been devised those for the relief of keratoconus have been among the least satisfactory. But if the literature be carefully scanned the conclusion must be reached that the most successful procedures have been those that have reduced the intraocular tension.

Thus, as far back as 1811, repeated puncturing of the cornea at the periphery was performed. Tyrrell later advised a peripheral iridectomy. Critchett produced a prolapse of the iris and ligated it. Von Graefe, Bowman, Swanzy and others either excised, trephined or cauterized the apex of the cone. All of these procedures, either intentionally or otherwise, lowered the intraocular tension temporarily or permanently.

Whether the cause of the protrusion be malnutrition, a refractive error, lid pressure or a disturbance of internal secretion either separately or collectively, it would seem to be self evident that the intraocular tension is too great for that particular eye altho apparently normal to palpation.

The beneficial results obtained from the use of myotics, as suggested by Jackson and others, would also tend to support that view.

Reasoning along these lines it occurred to the writers that a procedure that would permanently lower the intraocular tension and reduce excessive lid pressure, would check the progress of the disease.

METHOD OF PROCEDURE.

To overcome excessive pressure by the lids, we first do a canthoplasty—a suggestion made by Dr. Edmund E. Blaauw, severing the obicularis at its insertion by cutting the external canthal ligament. This is done on both eyes. The lids for the canthoplasty

are anesthetized by injecting five minims of $\frac{1}{2}\%$ novocain into the skin at the external canthus. Four or five drops of 4% cocaine are meantime dropped into the culdesac at intervals of three minutes, a drop of adrenalin being added with the last drop of cocaine. Three sutures are then put in uniting the conjunctiva to the skin at the external canthus. This practically eliminates excessive lid pressure.

The next step is on the eyeball. This is a modification of the operation done by Lagrange for glaucoma. A fold of conjunctiva is seized about one centimeter from the limbus above, incised horizontally and undermined as tho performing an Elliot operation, splitting the cornea with a slightly dulled keratome for a distance of about 2 mm. The conjunctiva is then pulled down and a small Graefe knife introduced at the limbus as for a cataract operation, coming out at the opposite side, the length of the incision being about 10 mm. The knife is carried slowly upward in the anterior chamber close to the root of the iris, leaving a crescent of sclera about 8 mm. long by about 3 mm. wide, attached to the conjunctiva. This shelf of sclera is cut off with delicate straight scissors. An iridectomy is next performed. The pillars are then straightened out, one suture inserted to unite the conjunctiva and the eye bandaged. The operation is practically painless and bloodless. The advantages of this procedure are that it has a tendency to permanently reduce intraocular tension, reduces corneal opacification, is not complicated, causes very little reaction and no additional scarring of the cornea. In parenthesis we may add that with the exception of the canthoplasty we have been performing this operation for glaucoma for the past two years.

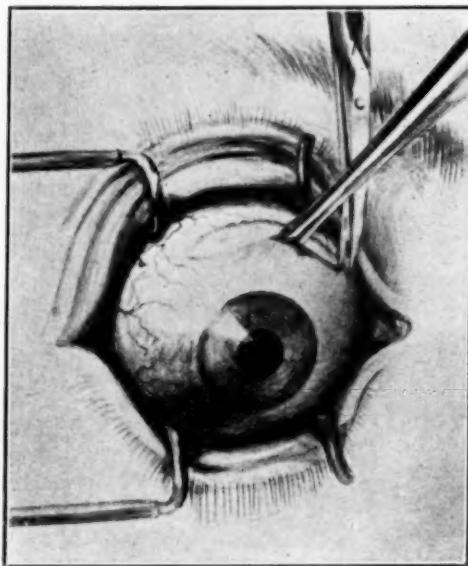


Fig. 1—Conjunctiva incised horizontally.

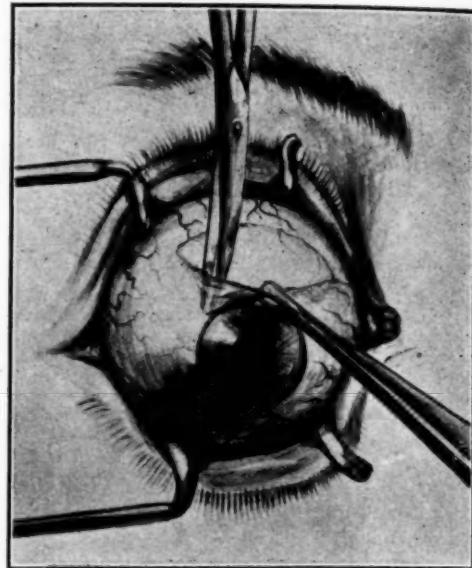


Fig. 2—Conjunctiva undermined to the limbus with sharp-pointed iridectomy scissors.

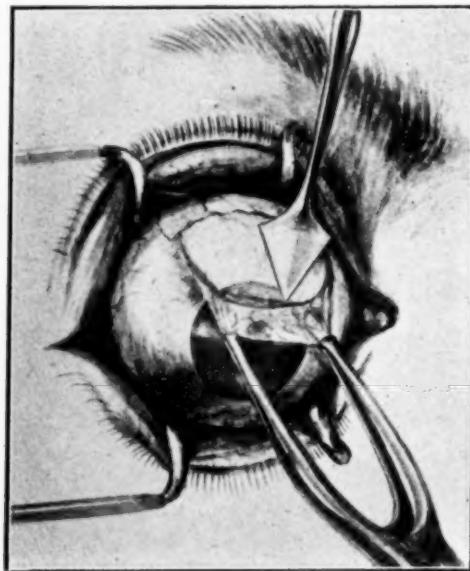


Fig. 3—Splitting of cornea with a slightly dull keratome for a distance of about 2 mm.

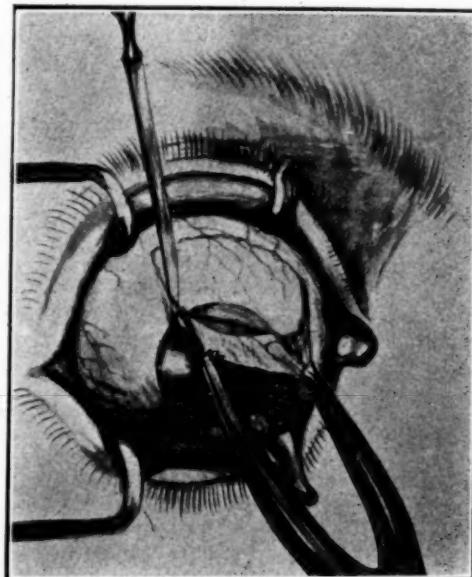


Fig. 4—The flap of conjunctiva pulled forward and a small Graefe knife introduced at the angle into the anterior chamber.

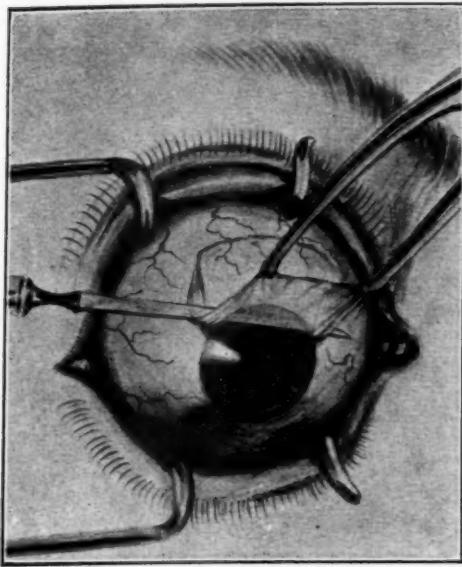


Fig. 5—Graefe knife within the anterior chamber, the point of counter puncture being about 10 mm. from the puncture, the knife being carried slowly upward, coming out above the limbus in scleral tissue.

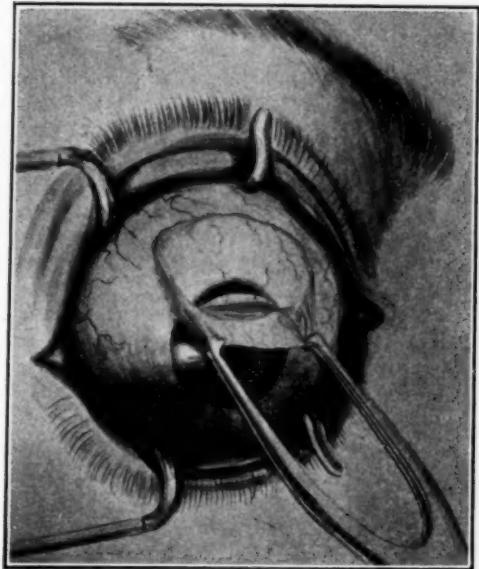


Fig. 6—Conjunctiva pulled forward, showing projection of sclera to be cut off.

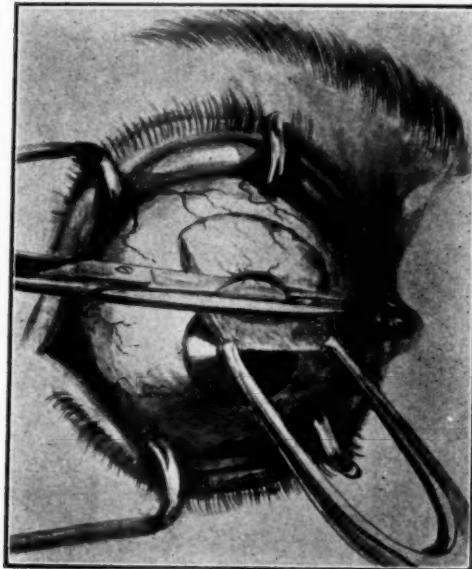


Fig. 7—Shelf of sclera is cut off with delicate straight scissors.

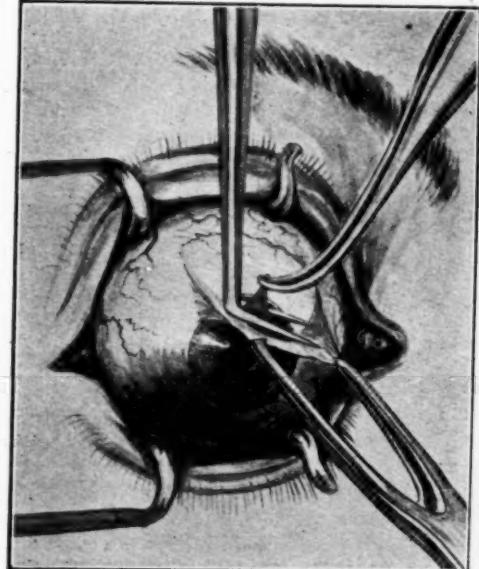


Fig. 8—Iridectomy.

The following two cases were operated upon by the above method:

CASE I. R. M. Male, age 24. Occupation, engineer. September 17th, 1918. History: measles at age of six. Poor sight since then. Wearing glasses about ten years.

Examination:

Right eye—3.50—4.50 ax. 90° =4/60.
Left eye—0.75+6.00 ax. 180° =4/7.5.

Marked conical corneas of both eyes. There was a nebula below the center of the right cornea. Correction of the refractive error and treatment with pilocarpin resulted in no improvement in the right eye but raised vision in the left eye to 4/6. As he was suffering from photophobia and headache an operation on the right eye was advised. This was performed by the above method on Oct. 12th, 1918, and on Oct. 18th, 1918, the patient was discharged from the hospital. There was very slight photophobia or injection.

Jan. 20th, 1919:

Right eye—2.00—2.50 ax. 60° =4/10.
Left eye+5.00 ax. 180° =4/7.5.

CASE II. Mrs. H. W. W., age 28. Jan. 2nd, 1919. History: Vision has been gradually failing for the past seven or eight years without apparent cause. Has always enjoyed good health. Has marked photophobia. For the past five years has been wearing:

Right—1.00+4.00 ax. 165° .
Left—1.00+5.00 ax. 180° .

Examination:

Right eye—1.50+4.00 ax. 165° and pin-hole=4/6.

Left eye—1.00+5.00 ax. 180° and pinhole=1/30.

Right cornea conical but clear. Fundus normal. Left cornea extremely conical.

Under the corneal microscope the apex of the left cornea was found to be slightly flattened, about 4 mm. in diameter and below center. The corneal substance in that area appeared opaque, macerated and distinctly thickened, having a spongy appearance with fluid in the interstices.

The left eye was operated upon Jan. 7th, 1919. On Jan. 9th the dressings

were removed and scarcely any reaction was present, while the cornea was considerably clearer than before operation. The stitches were removed on Jan. 13th and the patient discharged from the hospital. There was only a

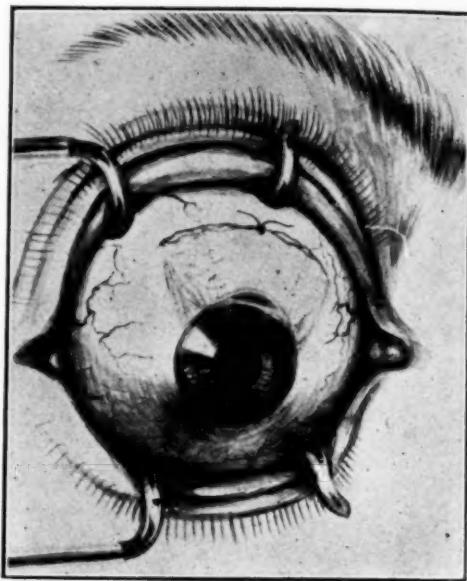


Fig. 9.—Pillars of iris replaced, conjunctival flap held in position by one suture. The small dark crescent-shaped area above limbus marks the spot from which the shelf of scleral tissue was removed.

faint nebula left at the apex.

January 15th:

Left eye+2.50 ax. 180° =4/15.

March 8th, 1919:

Right eye—5.0+10.00 ax. 165° =4/7.5.

Left eye+2.00 ax. 180° =4/15.

Left cornea shows a very faint opaque line in place of the circular opacification.

In comparing the progress of the two eyes in the second case, it will be seen that in spite of the canthoplasty on the right side the astigmatism increased while the vision decreased, showing that reducing lid pressure is by itself insufficient. The astigmatism in the left eye on the contrary, was reduced to less than half of what it was before operation, while vision was markedly improved.

NOTES, CASES AND INSTRUMENTS

RECURRENT IRITIS ASSOCIATED WITH DERMATITIS EXFOLIATIVA.

SANFORD R. GIFFORD, M.D.
OMAHA, NEBRASKA.

A., a man of about 30 appeared at the University of Nebraska Dispensary on account of pain and loss of vision in the right eye for the past week. He showed iritis of moderate severity in the right eye, with small irregular pupil.

His history was interesting. Four years ago he contracted what he thought was poisoning by poison ivy, tho he was not sure of his exposure. It was attended by marked reddening and subsequent desquamation of the skin of both forearms and hands. Since then he has had similar attacks each autumn, and several times in the spring and summer. Besides the local symptoms, he has felt generally ill during the onset of the attacks, and thinks he has had a fever. The last two or three attacks have been accompanied by symptoms in the right eye similar to the present ones. Venereal history was negative. At present he shows a marked desquamation of the skin of both forearms and hands, large flakes of epithelium being partially detached, showing an inflamed dermis beneath. There are some raised blebs, but in most cases desquamation has occurred without previous bleb formation. The skin condition seems to be one of dermatitis exfoliativa.

The patient was prescribed atropin and heat locally, and large doses of sodium salicylat internally. He was told to return and also to report to the skin clinic. But he never appeared again, and could not be located; so that neither the opinion of a dermatologist nor a Wassermann could be obtained, and many other features of the case could not be worked out. The history of his skin trouble seemed to exclude syphilis as its cause.

Tho all the usual causes of his iritis could not be excluded, its association with the attacks of skin trouble was fairly definite. Whether the original attack was really due to *Rhus Toxicodendron* is rather uncertain; but it seems certain that this could not have been true of his later attacks. Stellwagon describes dermatitis exfoliativa as often occurring with acute systemic disturbances, fever, etc.; and as usually subject to recurrences after remissions of weeks or months. Tho usually more general, it is sometimes confined to the extremities. He says that arthritic symptoms and other complications occur in the chronic cases, tho the etiology is obscure, and tuberculosis has been invoked. Sachs and others think an autotoxic process is responsible.

I have seen no account of any form of uveitis associated with dermatitis exfoliativa; but the facts that arthritis occurs with it and that an obscure autotoxic or infectious process may be its etiologic factor, suggest that iritis may in this case bear the same relation to the underlying cause of the dermatitis as it usually does to a streptococcus infection, gonorrhea, syphilis, or tuberculosis; manifesting themselves in joints, glands, or other organs at the same time with the uveal affection.

AN OPERATION FOR TRICHIASIS.

Z. C. LAYSON, M.D.
FAYETTEVILLE, ARKANSAS.

To correct trichiasis especially where there is also considerable ptosis, as in those cases resulting from trachoma, I am using a method which I here endeavor to describe:

The skin incision is made parallel to and about 2 or 3 mm. above the lid margin. It extends along the entire length of the lid and divides the tissues down to the tarsus. The upper skin

flap so formed, together with the other tissues overlaying the tarsus, is dissected free from the tarsus up its superior border. The lower skin flap is then dissected free from the tarsus down to the lower or free border of the tarsus, and the dissection continued

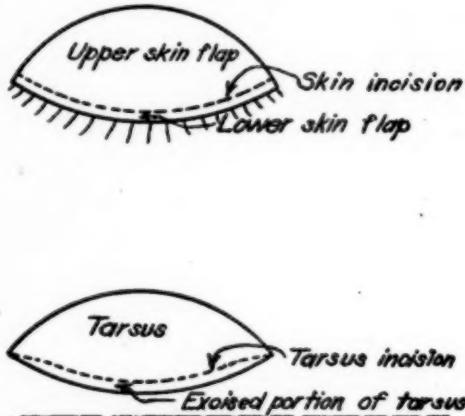


Fig. 1—Layson's operation for trichiasis.

around this lower border detaching the palpebral conjunctiva upward for about 2 mm. on the under surface of the tarsus. This strip of tarsus of about 2 mm. in width, and tapering at each end, should be dissected free thruout the length of the tarsus. This portion of tarsus freed is then excised. In freeing the conjunctiva from the tarsus because of the intimate adherence, the dissection must proceed carefully to avoid buttonholing the flap. Any fibers of the orbicularis remaining on the lower flap should now be excised with scissors. If there seems to be too great a redundancy of skin in the upper flap a small strip of it might be excised before placing the sutures.

The operation is completed by bringing the tissues together in the desired relations by three or four silk sutures. A curved needle is used passing from without inward thru the lower skin flap, then thru the tarsus alone at its upper border, then from within outward thru the upper skin flap. All the sutures are thus introduced. When they are tied the cilia portion of the skin is placed up and away from the

eye and the newly made lower tarsal border is covered with conjunctiva.

Besides correcting the trichiasis the operation markedly obliterates the effect of the ptosis, causing the lid to appear well elevated.

LOSS OF INDUSTRIAL VISION.

WALTER N. SHARP, M.D.

INDIANAPOLIS, IND.

What is the percentage of loss of industrial vision? This is a question the court or industrial board asks when an employee's vision is considerably reduced by reason of accident to an eye.

We might ask the court what it considers as industrial blindness, or 100% loss of industrial vision; for without knowing this we cannot estimate the percentage of loss of vision.

The percentage of industrial vision has evidently been estimated too high; as most attorneys believe that if 20/20 equals normal, or 100% vision, then 20/40 must represent 50% loss of vision. We should then ask, upon that basis what would 100% loss of vision be?

The percentage of loss of vision is confusing to the employee, the attorney and even the oculist, and no uniformity of percentage can be attained until we use a uniform system of test-types and numerator; nor until industrial boards of the various states adopt a standard loss of vision to represent 100%.

A number of states, including Indiana, have concluded, by law, that 20/200 vision represents 100% loss of industrial vision. This being the case, then every foot lost must represent 0.5% less 10% for the numerator (20 feet) which is normal, or 100% vision, thus:

Loss of industrial vision.

20/200	=	10% vision	or	90% loss
20/150	=	35%	"	65% loss
20/100	=	60%	"	40% loss
20/ 80	=	70%	"	30% loss
20/ 70	=	75%	"	25% loss
20/ 60	=	80%	"	20% loss
20/ 50	=	85%	"	15% loss

$20/40 = 90\%$ " " 10% loss
 $20/30 = 95\%$ " " 5% loss
 $20/20 = 100\%$ " " no loss

If one uses the metric measurements, as I do, the percentage of loss is the same. 6/60 representing 100% loss of industrial vision, we have a loss of 1 2/3 for every meter lost, less 10% for 6/6 or normal vision.

After I had completed my table I found that it corresponds with the table included in an article by Dr. Vernon A. Chapman and printed in the transactions of the American Academy of Ophthalmology and Oto-L. for 1917-18.

Should we compute our percentage of loss of vision upon the basis of 20/20 (6/6) as 100% vision, then 20/200 (6/60) would be but 54% loss; 20/100 (6/30) 24% loss; 20/40 (6/12) 6% loss; etc. These correspond with a table included in an article by Dr. Samuel G. Higgins and published in the AMERICAN JOURNAL OF OPHTHALMOLOGY, Nov., 1919.

What may be 50% loss of vision for one employee may mean 100% loss of vision for another, who is dependent upon a greater visual acuity to continue his vocation. I will leave this, however, for legislation to decide.

There is great need at this time to decide just what the percentage of loss of vision is, and just what it means to the individual employee. The latter can only be gotten at from an individual economic standpoint; and should be decided jointly, by oculists and the courts. The former should only be decided by oculists. I trust the time will soon come when we can have a standard basis upon which to work, also a test card for universal use, based upon metric measurements.

CATARACT PROBABLY DUE TO X-RAY EXPOSURE

OSCAR WILKINSON, A.M., M.D.

WASHINGTON, D. C.

Read before the Medical Society of the District of Columbia in March, 1920.

The case which I wish to present is one of double cataract in a woman only

40 years of age. The history in this case is negative up to two years ago. She first came to see me in October, 1917, complaining of failing vision and a slight irritation of eyes on use.

Examination revealed nothing abnormal about the eyes except a slight irritation of the conjunctiva, a low degree of astigmatism and a slight clouding of both crystalline lenses, more

20
marked in the left eye. R.V. = -2 ,
 20

and L. V. = -30 with a low cylindric correction.

A general examination of the patient by her physician revealed: blood normal, urinalysis negative; examination of tonsils, teeth and sinuses negative, and no digestive disturbance. No physical abnormality was noted except a very extensive lesion of lupus erythematosus, which covered a considerable portion of each cheek and a part of her nose.

It is to be noted that the patient is gray, and without further analysis one might consider the gray hairs and cataracts as marks of early senility. However, I learned on inquiring into her family history that her father became gray at 36, his sister was white-headed at 25, and this patient and her sister began to get gray as early as 17 years of age, and she was quite gray at 25.

I ordered correcting lenses, and gave stimulating eye drops of zinc sulphate and requested her to return in a month, at which time there was a very slow but decided increase in the lenticular opacities. I then advised a more vigorous treatment, which consisted in the use of dionin and mercury cyanide, a drop each night, with hot and cold fomentations three times a day and the use of K. I. and small doses of Hyd. Bichlo, three times a day after meals; and this was changed to iron and arsenic tonic treatment, when no improvement was manifested.

No progress being made, and in view of the fact that she had lupus, despite a negative reaction to tuberculin, she was given twenty injections of gradually in-

creasing doses of tuberculin R. without effect either positive or negative.

In my search for an etiologic factor, I learned from her that during the two and one-half years prior to her first visit to me, she had had her face exposed to the X-ray for the treatment of the lupus erythematosus. The first year she was treated every ten days, making a total of 36 exposures that year, and the second year and a half she had a treatment every two weeks, which would make 36 treatments. Allowing for some lapses or broken dates, it would be safe to estimate that she had more than 60 X-ray treatments; and at no time were the eyes protected with lead sheet, leather, or any filter. What is probably more significant, she states that she made a habit of looking at the small light in the Coolidge tube while she was being treated, thus exposing the lens to the ray with no protection except the transparent cornea and the aqueous humor.

Cataract has been produced by radiated heat. Cataract occurs more frequently in furnace workers and bottle workers than in other occupations less exposed to excessive heat.

In Mexico and other sunny climes cataract is much more frequent than here in the United States, and this has been attributed to the excessive sunlight. The natives of India are more frequently affected with cataract than we are here, and this has been ascribed to the excessive sun and heat and also to the fact that the cataracts in the natives of India contain an unusual amount of silicon.

Verhoeff and Bell were of the opinion that heat had more to do with the production of cataract than light. Burge made some experiments in which he showed that a lens exposed to ultra-violet rays, especially when the lens is charged with certain salts of calcium, magnesium or silicon, becomes opaque.

The elements in this case which would cause one to consider the X-ray as a possible etiological factor are:

1. Double cataract developing simultaneously in a case so young, without any constitutional or local evidence of disease.
2. The excessive amount of X-ray exposures, more than 60 treatments having been given.
3. No filtration of the ray, as evidenced by the fact that the patient could look at the small light in the Coolidge tube.
4. The eyes being uncovered, open and not even having the protection of the lid with the skin-muscle and cartilage.

With regard to the present condition of her eyes and vision, I would state that in August, 1919, I did a double simple cataract operation under local anesthesia, making large anterior openings in the capsules and after expressing the lens, the anterior chambers were thoroly irrigated with normal salt solution, the iris and the corneal flaps were coaxed into their normal positions,—a drop of eserin instilled, and the eyes bandaged for 48 hours.

The points in this case to which I wish especially to invite your attention are, first: Vision R. with correc-

20

tion is —, and Vision L. with correc-

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20

tion is —. In the second place, the

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perfectly normal appearance of this lady's eyes. One might examine her casually and not even notice that she had ever been operated upon. Both pupils react to light and are almost normal in size; the right pupil a little larger than the left. Neither such a cosmetic nor visual result could have been obtained had an iridectomy been performed.

SOCIETY PROCEEDINGS

Reports for this department should be sent at the earliest date practicable to Dr. Harry S. Gradle, 22 E. Washington St., Chicago, Illinois. These reports should present briefly the important scientific papers and discussions.

ROYAL SOCIETY OF MEDICINE.

SECTION OF OPHTHALMOLOGY.

February 4, 1920.

President, MR. W. T. HOLMES SPICER,
F. R. C. S.

New Formed Vessels on Iris.

MR. G. WINFIELD ROLL showed a patient who exhibited such vessels on the iris. The history of the condition dated from infancy. The right eye had a number of vessels on the front of the iris, converging from the periphery to the margin of the pupil. The eye was blind, and somewhat disorganized, and it having recently become painful, the patient was anxious to part with it. The good eye showed areas of coloboma in the fundus, that below the disc appearing like a congenital one in the choroid. A floating band in the vitreous came forward to the back of the lens, but Mr. Roll was unable to trace it to its attachment. The patient was highly astigmatic, namely, 6/12 with prism. He asked for suggestions as to causation.

DISCUSSION.—Mr. E. Treacher Collins pointed out that some of the vessels of the iris seemed to turn round the pupillary border, others were in front of the lens capsule. He thought the condition was probably the persistence of the fetal vascular system. When the eye had been removed he believed there would be found a patent central hyaloid artery.

The President spoke of having seen a certain number of similar cases, and in one case it was inflammatory, an old iritis and cyclitis case, followed by increased tension. At that time he was not clear as to how far the prolonged use of eserin increased the growth of the vessels.

Detachment of Retina.

Dr. A. Hugh Thompson showed a case of macular detachment of the

retina, probably by new growth. His colleagues advised enucleation of the eye without delay. Four months ago, there was very little to see: the macula was not raised more than 2 D., and the diagnosis was by no means easy. Since then, however, there had been a regular grey detachment, and it was steadily increasing. There had not yet been any increased tension. If the cause was a new growth, it occurred exactly at the macula, which was not a common site for growths.

Pulsating Exophthalmos.

MR. H. GRIMSDALE showed a case of pulsating exophthalmos of 65 years standing: the case was exhibited in 1883 by the late Mr. Frost. It followed on a street accident. In the literature the statement was generally made that the prominent feature of these cases was paralysis of the third nerve. In the few cases he had seen, however, it was the sixth nerve which was most markedly paralyzed. This man had complete action of the third, but paresis of both sixths. In a case he recently saw, in which rupture occurred without traceable cause, the first symptom was diplopia, due to paresis of the external rectus. It was what one would expect, seeing that the sixth was lying well within the pressure area, so that its conductivity would be interfered with comparatively easily.

DISCUSSION.—Mr. C. Higgens related two cases of the condition which came on during labor, and in a few months cleared up spontaneously.

Mr. J. H. Fisher said the cases of the kind he had seen had not been notable for paralysis of any of the extra-ocular muscles, but he agreed that the sixth was the most likely to be paralyzed. He believed there were two classes of cases. The first were definitely due to a fractured base, which lacerated the carotid artery, and obviously the sixth, the nerve lying on the floor of the cavernous sinus, would be

the nerve most likely to be implicated, the third nerve, being higher in the sinus, would be likely to escape damage. In the second class of case he thought there was usually a history of a fall, rupture of a diseased artery being the first trouble, this disturbance of circulation resulting in the fall, the latter being therefore the secondary phenomenon. Here again the most likely nerve to be injured was the sixth.

Gunshot Wound of Occipital Lobes.

Mr. Norman B. Fleming showed a case of gunshot wound of both occipital lobes, with eye trouble. The wound was due to shell fire, and there was a deficiency of the vault of the skull over an area, roughly circular, $2\frac{1}{2}$ inches in diameter, in the mid-line, the lower part of the aperture being one inch above the inion. At the casualty clearing station, fragments of bone and metal were extracted: there had been no later operation. He now complained of headaches, giddiness, slight deafness on the right side, and some loss of sight, the central vision was acute. The eyes presented no objective abnormality. The visual fields suggested complete destruction of the dorsal part of each visual cortex.

DISCUSSION.—Mr. J. H. Fisher said such men when hit were, frequently, totally blind for days, and in lateral hemianopic cases there was direct laceration and damage of one half of the vision centre, and a concussion effect in the other half, causing some edema of nerve tissues, and punctiform hemorrhages, some of it capable of recovery, but a small amount not.

New Growth in Eye.

Mr. N. Bishop Harman showed a case of new growth in the eye of a boy, which members considered to be a glioma. The mother said she noticed the eye shone unduly when the boy was 14 months old. Now, the whole fundus was covered with a number of round bodies, of various sizes. A month ago, signs of irritation commenced. He proposed to remove the eye, but the parents were very difficult to persuade.

DISCUSSION.—Mr. Elmore Brewerton held strongly that any child under six years of age who had a white mass in the vitreous, with increased intraocular tension, should have the eye removed. This eye certainly showed an increased tension.

The Radical Cure of Gonorrhreal Iritis.

MR. S. H. BROWNING said: gonorrhreal iritis, being a late sequel of gonorrhea, was not usually seen first by venereal disease specialists, and was often not treated as a urethral affection. He contended that very few, if any, cases of gonorrhreal iritis ought to occur, and certainly there should not be recurrent cases if proper treatment were carried out. His object in reading the paper was to show that by thorough treatment of the genitourinary tract in subjects of gonorrhea, the iritis would be permanently cured.

He regarded gonorrhreal iritis as a toxic condition, that it was not due to the actual presence in the eye of the gonococcus. In only one case had the organism been isolated from the eye itself; and that was in Sidler-Huguenin's case, in which it was discovered in the bloodstained exudate from the anterior chamber of a case of gonorrhreal septicemia. The author had himself tried many times to cultivate the organism from the exudate within a few seconds of it being drawn off, but had always failed.

In these cases there was usually a history of gonorrhea some years previously: he had never seen a case of iritis during the acute stage of urethritis, and others had confirmed this, on the observation of many thousands of cases. There is, in these cases, a specific reaction to gonorrhreal vaccines. It is not invariably associated with gonorrhreal rheumatism. There is a recurrence of the iritis, or an exacerbation of the symptoms after prostatic and vesicular massage, probably on account of toxins being thereby liberated into the blood stream. The diagnosis is also helped by eliminating such sources of infection as pyorrhea, septic tonsils, ear trouble, cystitis, and alimentary affections. The complement-

fixation test had not given reliable results in his hands.

He considered treatment under two heads: preventive and radical. The first of these rested with those who saw such cases early. He laid great stress on the need for thoroness at the hands of a genitourinary specialist, for in that case he believed there would be no such condition as gonorrhreal iritis. Tho vaccines did not materially shorten the acute stage of the disease, complications and sequelae were largely prevented by their use.

The radical treatment should consist of: (1) Immediate treatment by the ophthalmic surgeon, (2) the immediate use of vaccines, (3) continued treatment by vaccines and prostatic and vesicular massage, with, if necessary, treatment of the urethra. While an autogenous vaccine is being prepared, he urged the use of suitable doses of a reliable mixed vaccine. Some of the loss of repute of vaccine therapy in this connection, he attributed to the haphazard use of commercial vaccines. The proper dose of vaccine varied with each patient: his own range of experience varied between five millions and five hundred millions. Vaccine therapy was no more than an aid to medical and surgical treatment: it was not a substitute.

The author then proceeded to outline the proper method of carrying out massage of the prostate and vesicles.

He did not think iritis was often due to other bacteria found after massage, such as staphylococci, B. Coli, diphtheroids, etc. He had not met with a case of gonorrhreal iritis in a female. He narrated the leading facts in the histories of ten cases which he had carefully followed out, and which bore out his contentions: he had notes of 47 cases of the condition.

DISCUSSION.—Mr. C. H. Mills strongly urged that no form of massage should be commenced until the acute stages of the iritis had subsided. The same remark applied to vaccine injections. Again, vaccine injections should never be given when massage was being carried out, because the latter expressed into the general circulation a

large dose of toxins; that was especially important if the toxins had not been detoxicated. Men who had pyorrhea as well as gonorrhea seemed very likely to have joint troubles and other evidences of metastasis. But all cases of iritis which had a septic focus in the prostate or vesicles were not necessarily gonorrhreal iritis; even tho, years before, the patient might have had gonorrhea. He believed that in many of the cases the original gonorrhea died out, but a mixed infection succeeded and flourished on the areas originally damaged by the gonococcus. Colonel Young, of the American Army, had been conducting a research on rheumatoid arthritis, and he was keen on tracing some connection between this and chronic vesiculitis. From 300 subjects of rheumatoid arthritis he had excised the vesicles, and from most of them he had isolated a streptococcus. Mr. Mills considered that in towns and cities 80 per cent of the adult population had had gonorrhea at some time of their lives. The cases of iritis which did best with vaccine treatment were those in whom it occurred within about three years from the infection, for these people seemed capable of a generous manufacture of antibodies.

DISCUSSION.—Mr. C. H. Higgins related two cases in which the disease in the eyes ceased to recur at about sixty years of age. One had vaccine treatment, the other did not. He attributed the cessation at that age to the patient having by then used up his stock of toxin, and not placing himself in the way of receiving a fresh supply.

Mr. Bishop Harman raised the question of carriers of the gonococcus, especially in its relation to marriage.

Mr. C. B. Goulden and Mr. William Lang continued the discussion.

Mr. Whiting spoke of the marked negative phase which occurred after giving a vaccine, and which was sometimes alarming, tho he had seen no ill consequences from it. It was followed by a very definite positive phase. He urged the importance of thoro treatment of the gonorrhea at the hands of specialists.

PITTSBURGH OPHTHALMOLOGICAL SOCIETY.

February 9, 1920.

President, E. B. HECKEL.

Dermoid Cyst of Orbit.

DR. EDWARD STIEREN exhibited a patient, a young married woman, twenty-three years of age, presenting a pronounced exophthalmos of the right eye, with a displacement downward. There is no diplopia and the rotations of the affected globe are normal, aside from a

carefully separated from its periosteal attachment and removed en masse.

The lacrimal gland had been forced out of its fossa by the growth and was found to be prolapsed. The major gland was removed, leaving the accessory gland in situ. Perfect union of the soft parts resulted, with practically no surgical reaction and the cosmetic result today is perfect, the scar being hidden in the normal fold of the lid. When sectioned, the growth was found to contain much caseous ma-



Fig. 1.—Dermoid cyst of orbit. (Stieren.)



Fig. 2—Dermoid cyst of orbit. After operation.

limitation of upward movement. The condition first became noticeable when she was five years of age and has advanced steadily since. A hard non-fluctuating mass can be felt in the upper, outer portion of the orbit.

Under general anesthesia an incision was made, beginning at the middle of the upper rim of the orbit, in the sulcus of the upper lid, and extended outward and downward to the external angle of the orbit. Dissection revealed a spindle shaped, smooth, encapsulated growth, with its greatest diameter well under the roof of the orbit at the outer angle and extending backward toward the apex. The growth was

terial and a large number of short hairs resembling cilia.

DISCUSSION.—Dr. Edward Weisser reported that he had operated a similar case several years ago. Dissection showed a large, relatively superficial cyst, and a number of smaller cysts more deeply placed in the orbit. He removed the large cyst, leaving the smaller ones in situ. The cosmetic and functional results were perfect.

Nonmagnetic Foreign Body in the Lens.

DR. JOS. STEIN reported that about four months ago, while chiseling an automobile gear housing, the patient

was struck in the left eye by a small fragment of metal. The patient said that there was not much reaction, but that the vision of the eye is failing. Examination disclosed a small scar of the cornea 3 mm. from the limbus on the XII o'clock meridian. The lens shows beginning opacity, and a minute, faintly glistening foreign body can be seen on the posterior capsule. Use of the Sweet and giant magnets made no impression on the foreign body. X-Ray examination shows the object to be 3 mm. posterior to the center of the cornea and in the vertical meridian. The object is undoubtedly metallic but may be nonmagnetic.

DISCUSSION.—Dr. Heckel advised removal of the foreign body with extraction of the lens as soon as it becomes more opaque.

Dr. Stieren related an experience with a similar case. A man had a very small spicule of steel in the periphery of his lens; vision was 20/30 and the eye was quiet. The patient was told of the danger of cataract should the foreign body be removed. The eye remained quiet and had good vision for three years. It then developed a low grade iridocyclitis and vision was lost after 4½ years. Enucleation then became necessary.

Nevus at the Internal Canthus.

DR. ADOLPH KREBS exhibited a female infant in whom one week after birth, a small, red spot was noticed in the skin at the inner canthus of the right eye, which has gradually increased in size.

DISCUSSION.—Dr. Heckel advised treatment of the nevus by electrolysis. Dr. Murray spoke of the danger of fulguration in treating growths, etc., about the eye. He cited the case of a woman who had undergone this treatment for a papilloma on the lower eye lid, and who, three days later developed a sloughing of the cornea.

Transplantation of Superior and Inferior Recti Fibres for Convergent Strabismus.

DR. H. H. TURNER exhibited Mrs. W. A., aged 54, housewife, who was injured in an automobile collision Jan-

uary 2, 1918. When she regained consciousness four days later, she had a complete paralysis of the external rectus left eye, with a very marked convergent strabismus and diplopia, and was under care of family physician from time of accident until February 9, 1918.



Fig. 1.—Complete Paralysis of abducens. Turner's Case.

The examination at that time showed a complete paralysis of the left external rectus, with a convergent strabismus, so marked that the cornea was partially under cover. The ophthalmoscopic examination was entirely negative and the visual acuity:—R.E. 20/20. L.E. 20/70. The diplopia was so confusing that the patient found locomotion impossible without occlusion of the deviating eye.

The patient was put on K.I. and mercury, which were continued until July 2, 1918, without any return of function to the paralyzed muscle. July 2, 1918, the eye was operated under novocain and adrenalin anesthesia. A curved incision was made thru the ocular coverings, beginning at the insertion of the superior rectus, passing midway over the insertion of the external rectus and terminating at the insertion of the inferior rectus.

The tissues were dissected back exposing the tendinous insertions of the three muscles. The superior and inferior recti tendons were then split, the temporal halves freed and sutured (using 00—10 day chromic gut) under the tendon of the external rectus, which was not otherwise disturbed. The incision was then closed, the conjunctival sac filled with White's ointment, and both eyes bandaged.



Fig. 2—Result of transplantation of tendons in complete abducens paralysis.

The occlusion of both eyes was continued for eight days, with inspection and cleansing of the operated eye on alternate days. There was considerable operative reaction, which quieted within a few days.

On October 15th there was parallelism for distance and a vertical imbalance of 6 degrees, which remains unchanged to date.

She was ordered R.E. Prism 2 degrees—Base up. L.E. Prism 4 degrees—Base down.

Altho the abduction still leaves something to be desired, she has binocular fixation, except to the extreme outer portion of the field, is but rarely conscious of any diplopia, goes about her household duties, and shops in the city with perfect comfort.

DISCUSSION.—Dr. Edward Stieren referred to the unsatisfactory results usually obtained in these cases, and the question as to the best procedure to follow. He stated that he has been accustomed to make an advancement of the external rectus and has secured excellent cosmetic results, altho there is usually considerable difficulty with diplopia later.

Dr. Heckel suggested that it might



Fig. 3—Result of operation in Turner's Case.

be possible to increase the abducent action of the transplanted muscles, if the tendons could be attached to the sclera, above and below the insertion of the external rectus, respectively, well forward, the tension being relieved by a guy suture to be left in situ for several days.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

December 15, 1919.

DR. WM. L. NOBLE, President.

Loss of Vision Despite Restoration of Normal Tension.

DR. E. V. L. BROWN reported the case of Mrs. McC., aged 75. The left

eye was trephined 33 months ago. "Late infection" occurred 6 months later, but the eye healed with good central vision, a satisfactory form field, and tension of only 15. This status was maintained for 8 months more; when the vision suddenly dropped, from 6/10 to between 3/10 and 4/10 in the course of 4 weeks. The tension did not rise and the fields were little smaller. Four weeks later, the fields had narrowed to about 1/6 of what they had been; altho tension remained at 15. The patient was still able to get about by herself, tho no longer able to read print.

This relatively favorable status continued for about 10 months, when within a period of 27 days the central vision dropped from between 3/10 and 4/10 to less than 1/10, despite tension of only 9. In the last six months the patient had to be led about, and to all intents and purposes was blind from a glaucomatous process in which tension had not been found above 15 since she had a vision of 6/10, 33 months before.

Attempted Trephining by Purtscher's Method.

Mrs. R. B., aged 56, Jewess. The left eye suffered an acute attack of glaucoma 14 years ago. An iridectomy was done the next day and vision was restored to about what it had been before. L. V. is now 1.5 and Schiötz only 18, altho the nasal fields are almost gone, and temporal ones decreased to 1/4 normal.

Right V. failed suddenly in December, 1914, withcut pain. Widespread hemorrhagic retinitis was found 5 weeks later, but with a very shallow anterior chamber. Pupil dilated, oval and fixed, atrophic iris, 3 D. cupping of the disc, extending to the scleral ring, from 7 to 12 o'clock, with undermining at 12 o'clock. R. V. 6/200, form field concentrically reduced to about 1/10; tension had risen to R. 33 (L. 18). The disc was cupped 5 D. in the temporal half but none in the nasal half; 14 days later the nasal half was found cupped 2 D. under a tension of 31. (L. 16); R. V. = 8/10. Operation advised but refused.

Miotics were continued, and this normal central vision held for 28 months longer. The patient then absented herself from the clinic for 16 months, returning with tension 60 (L. 18), "completely and totally" cupped R. disc; R. V. = perception of light only. Almost no anterior chamber remained. The possibility of an acute attack in this eye was explained to the patient and she consented to a decompression operation.

Purtscher's double trephining was undertaken, in the hope of securing a flat, nonvesicular covering for the wound tract. A large conjunctival flap was made, the cornea grooved some 2-3 mm. above, and a 3 mm. von Hippel trephine put in position, with the intention of cutting thru merely the outer half of the sclera; and only that part lying under the upper circumference of the cutting edge of the trephine. To do this one pressed against the sclera with the part of the cutting edge lying away from the limbus.

A disc of outer layers of sclera was then dissected away from the inner half of the sclera but was left attached on the side nearest the cornea, and this attachment acted as a hinge for the scleral flap. It was then held aside and a 1.5 mm. hole trephined thru the remaining inner layers of the sclero-corneal tunic with an ordinary instrument. An iridectomy was then done and the hinged outer half disc of sclera allowed to go back with the inner trephine opening, and the conjunctiva replaced.

In this case the sclera was so thin that with the first revolutions of the von Hippel instrument the cutting edge went thru the entire thickness of the sclera, except the lower circumference; this was not cut and served as a perfect hinge. The ciliary body and some iris presented and was excised. A small amount of vitreous followed. The conjunctival flap was replaced. Healing had been uneventful, but the eye was still red and had a high tension.

Purtscher spoke of having performed the operation in only a few cases. Meller was well enough impressed with Purtscher's presentation to say it

should be given a thoro trial. He had given up Elliot's operation, except in older people, because vesicular scars resulted, and so frequently were eroded by lid action and led to late infection. The writer had also seen four late infections and had done as few trephining as possible since 1914. He therefore welcomed the Purtscher modification, but felt many scleras would be found too thin to go half way thru and no further, with a von Hippel instrument. He would try a hand trephine in another attempt.

Primary Acute Congestive and Sub-acute Glaucoma.

DR. CHARLES MAGHY reported on 100 cases treated at the Royal London Ophthalmic Hospital in 4 years, with the visual results. The classification followed was that of Colonel Elliot. Many of the acute cases, however, showed that a condition of chronic glaucoma existed in the other eye at some period. No attempt was made to divide the cases into the various stages. Aside from operation, the treatment was the same for each case, with the exception that most of the severe cases had leeches applied. Oily solution of eserin, 1 per cent, was used two or three times a day, during the first 24 hours, followed by the aqueous solution, $\frac{1}{2}$ per cent, three times a day.

Aspirin was occasionally given in large doses. Morphin was seldom resorted to for the pain. The operated cases received calomel and salts, except those taken direct to the operating room from the out-patient department. In all the trephined cases the Lang $1\frac{1}{2}$ mm. instrument was used, after being tested with fine kid and examined with a binocular loupe. Most cases had one fine black silk stitch in the conjunctival flap. A few cases had a Herbert's sclerotomy, but nearly all the acute cases had an iridectomy, the iris being torn out after being severed at one edge. A narrow Graefe knife was used to make the section.

Following the operation, atropin sulph., $\frac{1}{4}$ per cent, was instilled in the operated eye by some surgeons; in other cases it was not used until the second

day. Only the operated eye was banded. The tonometric tension was seldom recorded prior to operation. Fields were taken where the vision would permit. Many of the cases did not attend the hospital for many months after being discharged, so it was impossible to keep a record of their progress.

In the 87 patients there were 103 eyes with acute or subacute glaucoma. The cases with chronic glaucoma in the other eye were merely mentioned, with a note of the vision and condition of the optic disc. The right eye was involved in 48 and the left in 55 cases. There were 24 males and 63 females. As to age, one case was 25, 2 were 31, 20 were between 40 and 50, 21 between 50 and 60, 37 between 60 and 70, 14 between 70 and 80, and one between 80 and 90 years.

Influenza was present or preceded the attack in 4 cases, rheumatism in 4, and 3 cases had pyorrhea very badly. In 2 there was a history of injury before the attack set in, and 5 cases showed a postoperative injury. A hyphema developed in 8 cases. In only 1 case was the iris pillar prolapsed and it remained in place after the use of an iris repositor.

The cases admitted without treatment numbered 61. Boric lotion was used by 13, atropin by 4, and eserin by 8 of the cases. Previous attacks were noted in 74 cases, while 26 came to the hospital during or just after the first attack; 65 patients saw rainbows, and 46 vomited with their attacks. A few patients were nauseated but did not vomit.

Acute congestive glaucoma was present in 69 cases and subacute in the balance. Of the 63 iridectomies, the iris pillars were drawn up to the wound in 4, not including the one that prolapsed. In the 35 trephined cases, the disc fell into the anterior chamber in one, without causing symptoms of irido-cyclitis. A Herbert's sclerotomy was performed in 1 case, and 1 case was eviscerated following infection. Three cases were unoperated and 1 refused operation.

The fundus was obscured by lens opacities in 7 and by vitreous opacities in 11 cases. In many of the latter cases, however, the fundus was seen at a later date. In 1 case the eye converged 20 degrees. In 2 cases the choroid was detached, but only for a few days. Retinal detachment occurred in two cases and persisted. Retinal hemorrhages were present in at least 3 of the cases, and in each case near the optic disc.

In 16 cases the optic disc was cupped. No cupping was seen in 75, while in the remaining cases the fundus was obscured. Vitreous opacities were present in 33 cases, altho in many the opacities were very fine and disappeared later. The nasal field in 11 was contracted from 5 to 30 degrees. Two cases showed a concentric contraction, one of 10 and the other of 20 degrees. In 4 cases no contraction was present, while in the remaining cases no field could be obtained, owing to the great reduction in vision at the time of entrance to the hospital.

The lowest tension prior to operation, recorded with a Schiötz tonometer, registered 25 mm. Hg., and the highest 42. In 9 of the cases the fellow eye had been operated upon for chronic glaucoma and in 3 for acute glaucoma at some previous period.

In a review of the literature of the past ten years, covering the period since the modern decompression operations were introduced by Lagrange and Elliot, the speaker had considered only those authors who had reported 10 or more cases. Many oculists had not given the details of their cases so that a comparison could be made.

One had to confine comparisons with the cases reported by Stock and Meller. Col. Elliot was unable to furnish his statistics for comparison with the above authors, and those of the Moorfields hospital staff.

The following table gives a comparison of Stock, Meller and the author, showing the vision on discharge; and the cases that improved, remained stationary or became worse. The cases included under the title "author" were operated upon by the following men—Treacher Collins, Holmes Spicer, J. B. Lawford, J. Herbert Fisher, J. Herbert Parsons, Percy Fleming, Claude Worth, A. C. Hudson, Foster Moore and Malcolm Hepburn.

DISCUSSION.—Dr. William H. Wilder stated that in chronic glaucoma it was important to consider the peripheral vision. Unless this was done one might fail to recognize changes going on as a result of the increased intra-ocular pressure.

In chronic glaucoma central vision was frequently maintained, while peripheral vision was gradually lost. The danger was probably greater in the eye that had a large physiologic cupping of the optic disc. The increased intra-ocular pressure might force the vitreous back into this normal depression, and more quickly make an abnormal cupping, with consequent impairment of peripheral and even central vision.

It was not uncommon to see acute cases restored to normal vision by timely operation for relief of the pressure.

It was also valuable to study the condition of the blind spot of Mariotte. The observations of Bjerrum, Seidel

RESULTS IN ACUTE GLAUCOMA.

Cases	VISION			Improved	Stat'y.	Worse
	S.	M.	A.	S. M. A.	S. M. A.	S. M. A.
4 0 10	Lt. Perc.	to hand	movements	0 0 0	4 0 3	0 0 7
3 4 12	Hand movements	to	1/60	1 3 4	2 0 5	0 1 3
2 1 21	1/60	to	6/60	2 0 18	0 0 3	0 1 0
2 0 31	6/60	to	6/18	1 0 31	1 0 0	0 0 0
3 0 9	9/18	to	6/12	1 0 9	1 0 0	1 0 0
0 3 11	6/12	to	6/9	0 3 11	0 0 0	0 0 0
8 3 9	6/9	to	6/6	3 0 6	2 2 3	3 0 0
22 10 103				8 6 79	10 2 14	4 2 10

and others had shown that an enlargement of this blind spot frequently could be demonstrated in the early stages of glaucoma, and as the condition progressed the enlarged blind spot tended to merge with other blind areas in the field.

The contention of Schweigger and Schnabel that many of the so-called simple glaucomas were optic atrophy had not been definitely proven, and tonometric examination of such cases revealed that the tension might be elevated at times. However, the presence of spaces in the nerve head, such as Schnabel had described might allow a lower intraocular pressure than equal to cause cupping of the disc, and exert an effect on central as well as peripheral vision. Some such process might account for the peculiar variations from ordinary types, that were described in some of Dr. Brown's and Dr. Carr's cases.

Those who advocated the use of miotics to the exclusion of operative measures urged them for cases that showed no active or congestive stages. But even in socalled simple cases, there might be variations in the degree of the intraocular pressure, demonstrated by repeated tonometric variations.

A safe working rule might be to rely on the miotic treatment only as long as it kept the intraocular pressure down to the normal, as indicated by the tonometer, and as long as the central and peripheral vision were maintained and the blind spot of Mariotte showed no marked increase. If the case showed any congestive phases and the tension could not be held to normal and the peripheral vision showed decrease, the patient should be informed of the danger and more radical procedures should be resorted to.

The excellent presentation by Dr. Maghy showed that iridectomy offered one of the best methods of treatment in the acute cases, but many men believed that for the chronic forms, something was lacking in iridectomy, and we must resort to some other form of operation.

Dr. Oscar Dodd was much interested in the patients who had loss of vision after reduction of the tension. In two cases which he had trephined with success, the tension came down to normal, but the vision decreased and the condition was apparently growing worse. Careful examination showed that in each case there was focal infection from the teeth, and when this infection was cleared up the vision returned to practically normal. He felt that it should be kept in mind that in glaucoma cases there were other things to be considered besides the eye symptoms.

Dr. Oliver Tydings agreed with Dr. Dodd. When the disc was blurred as Dr. Maghy mentioned it pointed to some inflammatory action. Vomiting pointed to toxemia of some kind. In one case there was detachment of the retina, in another retinal hemorrhage, the fundus was obscured in certain cases. While these things might and did exist in connection with glaucoma they were undoubtedly due to other factors than glaucoma *per se*.

He cited several cases which had been treated by eserin and pilocarpin, and had afterward cleared up to practically normal under the careful use of atropin. In one case he had followed this treatment with scopolamin and atropin and the vision was now 10/200 against fingers at 2 feet. He believed that in every case of glaucoma there was toxemia due to focal infection as a causative factor.

Dr. Francis Lane said the anatomic explanation for the permanent contraction of the field was a degeneration of the more anterior ganglionic cells of the retina. The peripheric cells appeared to possess less power of resistance to pressure and consequently were the first to degenerate. He had observed vacuoles in these cells at this location, which did not differ in appearance from those described following optic neuritis. All fibers of the optic nerve had ganglionic cell attachments in both the retina and the brain, so if in glaucoma the primary lesion lay in the ganglionic cells of the retina,

the changes in the nerve must be regarded as ascending atrophy. Optic nerve fibers did not follow the Wallerian law, because they had two centers.

The enlargement of the blind spot in glaucoma must also be explained on anatomic grounds. The lamina vitrea was the only structure of the retina and choroid which touched the optic nerve fibers. If glaucomatous excavation was present it could well be understood how this membrane could be subjected to traction or wrinkling at its border; thereby causing an anatomic disturbance of relationship of the rods and cones in the immediate vicinity, which would account for the increase in size of the blind spot.

Dr. Harry Gradle said that noninflammatory glaucoma was manifested by increased intraocular tension, due to increased secretion or to retarded outflow. The latter could be estimated by massage. Following two minutes of deep massage, the normal eye was reduced in tension about 8 or 9 mm. of Hg; if the reduction in tension was less than 4 mm., it might be said that the outlets of normal circulation were so blocked that a restoration to normal conditions could not be produced by miotics alone, and that operative interference would have to be resorted to.

The reduction in vision under increased intraocular tension was due to many factors, two of which were pressure upon the nerve fibers as they crossed the unyielding scleral ring, and pressure upon the ganglion cells in the periphery. When the nerve fibers were subjected to uniform pressure, the first to yield were the most delicate ones, and there was a reduction in central vision. If the pressure upon the scleral edge alone was the cause of the reduction, there would naturally be a greater reduction of central vision than of the visual field; but the reverse was true, showing that other factors were of greater import.

Dr. Michael Goldenburg was impressed with the cases reported by Dr. Brown. Vision kept going downward in spite of any method of treatment.

He thought probably the same conditions which produced arteriosclerosis had some relation to the production of glaucoma—some very insidious process going on in the body over a very long period.

The fact that every glaucomatous eye that came under the microscope disclosed an infiltration into the spaces of Fontana, root of iris, and frequently adhesion of iris to cornea, cutting off drainage was very significant. He was inclined more to the belief that focal infection produced a serious iridocyclitis with a so-called secondary glaucoma.

Dr. Maghy said he had seen 500 cases of eyes trephined, and had only seen two infections. The Elliot technic was not always used at the Moorfields Hospital surgeons. The disc in every case was taken out, and usually an iridectomy was done. He had seen many cases in which the conjunctival flap was torn, but they did not come to infection. There was just a root iridectomy.

Dr. Brown agreed with Dr. Wilder that more fields should be taken; also he would urge that disc and tension changes be followed more carefully. He agreed too that when congestive attacks occurred the miotic treatment should be given up and operation performed. Yet he was not satisfied with any of the operations, and advised miotics as long as central vision, fields, and tension could be maintained in *statu quo*. He did not agree with Dr. Maghy that late infections after trephining were due to faulty technic, altho he was at a loss to understand why there should be so few cases of late infection in England.

Retinal Folds Following Cellulitis.

DR. ROBERT VON DER HEYDT presented a patient who showed wrinkles in the form of vertical folds in the macular area.

The patient was a boy aged 11 years who had cellulitis several weeks previously, following which the wrinkles appeared in the left eye. The right eye was negative, so he was no doubt dealing with an immediate after result

of the cellulitis. There was evidently a clouding of the retina.

Such cases were rare in the literature. Vogt reported vertical reflex lines, and one case of vertical folds following cellulitis in an 18-year-old boy. Other observers had reported folds but not presenting a vertical direction. Examination with the red free light showed these to be real folds. He thought the fact that the folds were not more often seen was because they probably were transient in character and only occurred in young individuals. There was no lowering of visual acuity in this eye. No metamorphopsia was observed.

COLORADO OPHTHALMOLOGICAL SOCIETY.

January 17, 1920.

DR. W. C. BANE presiding.

Cyst in Anterior Chamber.

G. L. STRADER, Cheyenne, Wyoming, presented a boy aged 14 years, who in August, 1918, had been struck in the right eye with a stone thrown from a sling. When the boy was first seen by Dr. Strader two days later there was an incised wound $5/16$ inch long at the upper outer corneal margin, with a prolapse of the iris and the anterior chamber was filled with blood. The wound was covered with a sliding conjunctival flap and the iris prolapse was not disturbed. Five days later it was found that the flap had pulled loose. The margins of the wound were touched with trichloracetic acid, and the flap again pulled over the wound. The eye subsequently did well, and light perception and projection remained good. The patient was not again seen until January 5, 1920. About ten days previously the eye had become irritable and watery, and there was a great deal of photophobia. The eyeball was red but not very painful, the tension normal, and the upper outer fourth of the anterior chamber was occupied by a rather dark mass, the lower edge of which was of circular outline, resembling a lens margin. One or two blood vessels could, however, be seen

on the anterior surface of the mass, and reflected light showed it to be partially transparent. The condition appeared to be one of epithelial cyst secondary to the penetrating injury.

DISCUSSION.—G. F. Libby, Denver, thought the appearance was very suggestive of an inclusion cyst.

W. H. Crisp, Denver, felt that the mass was a cyst, its margin being too regular for that of a lens without its capsule, and the mass being too small for the lens within its capsule; and the diagnosis being also favored by the presence of the blood vessels and by the relatively transparent appearance.

Edward Jackson, Denver, suggested excision of as much of the cyst and of the adjoining iris as possible thru an opening into the anterior chamber. On opening the cyst thru the cornea, the tendency would be for the contents of the cyst to escape, and for the cyst wall to be cut off, but it might be better to attempt excision of as much of the iris as possible.

C. E. Walker, Denver, recalled a case of cyst of the iris in an old lady. She had also a cataract, and the cyst and the cataract were removed at the same time, including the iris on both sides of the cyst. She had no further trouble. The cyst was in the corneal section made with an iridectomy knife above, and was not ruptured in doing the operation.

Dr. Strader did not believe that there was any lens in the eye, because he thought he could see some opaque capsule in the tiny chink which was all that was visible of the pupil.

Glaucoma Secondary to Iritis.

W. A. SEDWICK, Denver, presented a married woman of 59 years whose right eye was greatly inflamed, the cornea being hazy and anesthetic, the anterior chamber somewhat shallow, the pupil occluded, and the tension plus 1. At the circumference of the iris were a number of petechial patches. The eye was not painful except to touch. The patient had suffered for fourteen years from a polyarthritis, which had caused a certain amount of deformity of the hands and feet. All

the upper teeth had been removed twenty years previously, and the lower teeth two years previously, the rheumatism having apparently been somewhat benefited as a result. The right eye had been red and swollen at various times during the past twenty years, with very little treatment. Nine months previously the patient had had a severe attack with vomiting, loss of appetite, and severe pains thru the temporal region. Since then the eye had never become white, and three weeks ago the present attack had begun. There was an argyrosis from prolonged use of argyrol. The case was probably one of acute glaucoma secondary to repeated attacks of acute iritis. There seemed little to do but remove the eye.

DISCUSSION.—J. A. Patterson, Colorado Springs, would have all the sinuses x-rayed before having the eye removed if it were his eye.

G. F. Libby, Denver, recalled a very similar case, in which after a second attack the eye became nearly blind. Following removal of diseased tonsils the man had gone on about five years without a further attack. Recently the vision was found to be about one-fourth of normal.

E. M. Marbourg, Colorado Springs, mentioned a case of chronic hemorrhagic glaucoma in which after repeated injections of salvarsan the eye cleared up, altho without vision.

E. R. Neeper, Colorado Springs, believed that the case should be gone into very thoroly. He suggested that atropin could be used in this eye. He would begin with homatropin and cocain, and see whether the eye would tolerate them. If the case was really one of glaucoma, the eye would probably quiet down following an iridectomy. The eye was certainly not hard at this time, and the pupil had probably become adherent while dilated during previous attacks.

F. E. Wallace, Pueblo. In these old blind eyes the first consideration is to save the other eye. There is danger later on of sympathetic ophthalmia. While it is well to look for a focal infection, I personally would remove the eye.

G. L. Strader, Cheyenne, Wyoming. We had a somewhat similar case a few months ago. Nothing we did had any effect, and in a few days the patient hardly had light perception. After removal of a tooth with an apical abscess, for two days he looked very much better. Then it took a grain of morphin to keep him in bed. X-ray of the sinuses was negative, but being suspicious of the appearance of the ethmoid cells we cleaned them out, and that night he had the first night's rest for two weeks. In a short time the vision was 20/30. We found no pus, but a large middle turbinite pressed on the septum.

J. A. Patterson, Colorado Springs. There is a hyperplastic ethmoiditis that does not have granulation tissue or pus, and from which you can have absorption just as you can have it from the pulp of a tooth.

Edward Jackson, Denver. I think three days' acquaintance with this eye would be a rather short time to condemn it, and that further attempts should be made to find the cause, but that unless decided improvement is brought about speedily the eye should be removed. I believe that the most important place now to look for a focal infection is inside the eye.

Old Right, Recent Left, Injury.

J. M. SHIELDS, for Melville Black, Denver, presented a man aged 53 years, whose right eye had been injured about thirty-three years previously while he was pounding on a hot metal plate, and whose left eye had been penetrated by a sliver of steel from a steel plate three years previously. It was probable that a metallic foreign body had penetrated the right eye, as evidenced by the closed pupil, the drawn iris with folds running with the radiating fibers, and the deep anterior chamber, suggesting that the lens had been absorbed. This eye had faulty projection. Following the injury to the left eye, there had probably been a corneal infection and a general uveitis, since the eye was still somewhat injected and blood vessels were present in a leucoma adherens which occupied the nasal half of the cornea. A fellow workman had

pulled the sliver of steel out of this eye. There were a number of new vessels in the iris of this eye, and the question was raised whether an iridectomy would be likely to succeed.

DISCUSSION.—Edward Jackson, Denver. An iridectomy on the left eye would not be a good thing to bet on, but it seems the only chance the man has. The outer part of the cornea seems to be in good condition, and the general nutrition of the eye good. The eye is not quite useless, but if there is a chance it should be taken.

C. E. Walker, Denver. I had a similar case in which it became necessary to operate. I took a knife a good deal like Dr. Jackson's cataract knife or the old Beers knife and passed it right thru the iris and the lens. Then I took a de Wecker scissors and made two very large snips of the iris and then left the eye alone. When the lens started to swell I made the usual incision and extracted the lens thru the coloboma made by the iridectomy. There is a great deal of astigmatism, but very fair vision. There was no trouble from hemorrhage of the iris.

W. H. Crisp, Denver, suggested that it was not altogether impossible to exclude capacity for vision in the right eye, as the poor visual projection might be due to the fact that the very minute pupil seemed to be occupied by a dense capsular membrane. Moreover, this eye was free from irritation. What could be considered in the way of an operation with the Ziegler knife on this eye?

Dr. Walker. If any operation could be done on the right eye, the Ziegler would be the ideal operation. Another thought, these men who work with steel are always getting fragments into the eye, and I make a regular practice of having an x-ray examination in these cases.

Dr. Jackson. I should not be inclined to work thru the small pupil, but to make two incisions into the iris. The probability is that back of the iris as well as in the pupil there is tough membrane that is adherent, and which would have to be divided. This right eye looks otherwise favorable.

F. R. Spencer, Boulder. Schnaudigel has advised a punch keratome which might be useful in a case like this.

Old Posterior Synechia and Lens Opacities.

J. M. SHIELDS presented for Melville Black, Denver, a woman of 20 years, who had had poor vision in each eye since a severe attack of inflammation at the age of 12 years. The vision of the right eye was 20/100, that of the left 20/70. Under atropin the pupillary margins were seen to be extensively adherent to the lens capsules. The use for a week of solid atropin and dionin daily had not caused any of the points of adhesion to break away. There was an opacity of each lens just posterior to the center of rotation, the opacity in the right lens being larger than that in the left. Should an iridectomy be done on each eye?

DISCUSSION.—F. R. Spencer, Boulder. The active influence of focal infection on these eyes may have passed, but at the same time the first thing to do is to look for such an infection. The next thing to do is to try an iridectomy. But it would not be wise to attempt surgical intervention before investigating the question of focal infection.

C. E. Walker, Denver. If the eyes are left in the present condition blindness will ensue. As the thing has gone on for a number of years not much is to be hoped for from such an investigation as Dr. Spencer suggests, but an iridectomy is urgently called for. Up to the age of 35 a needle operation can usually be done with good results.

Edward Jackson, Denver. I got two or three additional points of the girl's history. The inflammation happened when she was twelve years old after an attack of measles. The eruption did not come out well. Probably there was some sort of acute infection followed by the iritis. For some time the vision slowly improved, but for the last four years it has been stationary. With that stationary condition, and with the history of only one attack of iritis simultaneous in the two eyes, I think it is probably not a recurrent

iritis due to focal infection. Undoubtedly there is a little opacity of the lenses, which may increase as the patient gets older. In both eyes there is some space where the iris has retracted under the atropin. I think iridectomy is not urgent, and doubt whether optical iridectomy will give her better vision than 20/70. The pupils are rather large, there is probably some scar in the sphincter, and I should be disposed to try repeated instillations of eserin at long intervals, and not too strong. Atropin does not exert much pull on the adhesions, and the sphincter may be able to do something in the way of displacing them under the influence of alternate doses of eserin and atropin. Sometimes adhesions give way after a great many years.

J. A. Patterson, Colorado Springs. Where the pupil in such cases does not dilate, I find great advantage from the subconjunctival injection of dionin combined with atropin, holocain and cocaine.

W. H. Crisp, Denver, suggested that the so called measles of the patient's history might have been a syphilitic eruption.

J. A. McCaw, Denver. The age of incidence of congenital syphilis is between 5 and 15 years, and a Wassermann test should probably be made.

Penetrating Injury with Iron Staple.

D. A. STRICKLER, Denver, presented a man of 27 years who on the 8th of January had been struck in the right eye with an iron staple. When he was seen on January 15, there was a cut extending from the outer pupillary margin almost vertically to within 1 mm. of the limbus below. There was slight prolapse of the iris, and a horizontal cut in the iris extending outward 4 mm. The lens capsule was punctured to the temporal side, and swollen lens matter welled into the anterior chamber thru the tear in the iris. The temporal portion of the lens was cataractous, and there were striae in the nucleus.

DISCUSSION.—E. R. Neeper, Colorado Springs. The lens is undoubtedly go-

ing to break down, and is lost: and it should be removed.

J. A. Patterson, Colorado Springs. In a recent case of penetrating injury I at once made an iridectomy, and the vision was so fine that in a few days I did the same thing for a similar case. I believe that if you can you should do an iridectomy. You at once lessen the tendency to infection and give a chance for the wound to clear.

H. R. Stilwill, Denver, referred to a case in which the lens capsule had been ruptured by a nonpenetrating blow on the eye, and the lens substance had become entirely absorbed without surgical interference.

C. E. Walker, Denver. After injuries of this type in older patients, there is almost always a secondary glaucoma from swelling of the lens; and I believe the best permanent visual results in this class of cases are to be obtained from letting out the lens.

Thrombosis of Retinal Artery.

D. A. STRICKLER, Denver, presented a woman of 52 years whom he had seen in consultation with Dr. Swerdfeger. When first seen in the evening of January 9, she gave a history of complete blindness of the left eye, first noticed on waking that morning. On January 10, ophthalmoscopic examination showed the optic disc to be normal, that the veins were slightly large, somewhat tortuous, broken where crossed by the artery, with distal enlargement, and the arteries slightly diminished in size. The superior retinal artery showed as a white streak for some distance above the disc, no blood column being visible, and there was a small superficial hemorrhage two disc diameters above and slightly nasal from the optic disc. The left pupil did not react directly to light, but reacted consensually. On January 16, there was definite swelling of the nerve head, and a rectangular red spot in the macular region with small, less noticeable ones toward the disc. There was also a diffuse cloudiness of the retina. The urinary tests were those corresponding to chronic parenchymatous nephritis. Systolic blood pressure was 222 mm.,

and diastolic 150 mm. On January 12 the right eye was apparently normal, but more recently a small hemorrhage had been noticed about four disc diameters above the optic disc.

DISCUSSION.—F. R. Spencer, Boulder. The case was at first very suggestive of an embolism of the central artery in the left eye. We often have, however, in such cases a spasm of the artery, and under this condition an embolism will more readily occur. These disturbances may all be due to the arterial changes. I think the blood pressure should be lowered.

Edward Jackson, Denver. This case was likely one of arterial thrombosis. It was some hours coming on.

J. A. Patterson, Colorado Springs. I recently had a case of retinal detachment with extremely high blood pressure, albumin in the urine, and some slight heart lesion. I put her to bed for the detached retina, and it did not do that any good. I turned her over to a general man who gave her purgatives and plenty of water, and her improvement has been phenomenal. She got better in every way, and her albumin disappeared eventually. She was about 60 years of age.

Dr. Jackson. Clapp, of Baltimore, recently reported six cases of detachment of the retina in pregnancy which recovered, and there are a number of other cases scattered in the literature. Only a couple of days ago a man was in the office whom Stevens reported nearly twenty years ago, who was sufficiently frightened to reform his habits, and whose general condition is very much better. He would have unequal pupils, spasms of the arteries, and marked narrowing of the veins at the crossings, all of which symptoms are greatly improved.

Obstruction of Central Retinal Artery.

C. O. EIGLER, Denver, presented a man aged 42 years, a core maker by occupation, who on January 7 had had a sudden attack of complete blindness in the left eye. This lasted for twenty-four hours, after which he began to see shadows before the eye. The vision of

this eye had since improved to 5/100. The patient had complained for over two years of momentary blindness.

DISCUSSION.—Edward Jackson, Denver. The first time I saw this man at the clinic I thought the upper temporal artery was covered by opacity for quite a space, and there also seemed to be a stretch of bloodvessel that was filled with a white plug, no blood being visible. Then a few days ago there was some red where the white plug had been, and the part that seemed before to be covered up showed more blood thru it. The opacity extended from the upper temporal artery down toward the macula. It seems rather probable that the obstruction was an embolus, but it is to my mind very uncertain whether it was an embolus or a spasm. The history of previous attacks would suggest that it was a spasm.

C. E. Walker, Denver. I saw the case a few days after the accident, and found that the macula was white, there was one little red dot at the fovea, and the bloodvessels were blocked. I told him that it was due to constitutional trouble and that he should go at once to his doctor.

Obstinate Iritis with Synechia; Dental Causation.

C. E. WALKER, Denver, presented a man aged 39 years who had been for two or three months in the care of another surgeon on account of a persistent iritis. In spite of the use of atropin, the pupil had failed to remain dilated, the iris was beginning to come forward, the pupil was filled with a large amount of exudate, and there was almost no light perception. There was also a good deal of exudate on the posterior surface of the cornea. A more concentrated solution of atropin did not seem to produce any effect. Thoro examination of the nose and throat was negative. A dentist to whom Dr. Walker referred the case removed several teeth on account of root abscesses, and the eye promptly began to clear up and the pupil to dilate under an ordinary solution of atropin. At the time of reporting there were only

one or two adhesions below, and the vision had greatly improved.

Iridectomy for Glaucoma; Complications.

W. H. CRISP, Denver, presented a woman aged 33 years who had developed several complications following an iridectomy for glaucoma, but who was now apparently permanently cured. She was Italian by nationality, extremely emotional. The vision of the left eye had been completely lost from glaucoma during 1918. When the patient was first seen by Dr. Crisp in February, 1919, the vision of the right eye was 5/5 most, but the tension of this eye was 57 mm. of mercury, in spite of a miotic having been used that morning. The tension of the left eye was 69 mm., altho this eye was also under a miotic. The lowest tension obtained in each eye after two days' use of eserin was R. 37, L. 52 mm. of mercury. The right vision at this time was 5/4 partly, and the tension of the right eye varied during the next week between 37 and 40 mm. Iridectomy was done on each eye, and after removal of the dressing a moderate hemorrhage was found to have occurred into the vitreous a little behind the lens, almost completely cutting off the vision of the right eye. Almost five weeks after the operation the vision of this eye was 1/60, two weeks later 1/20, and rather more than two months after the operation 5/12 plus 1 with correction of 8 diopters of hyperopia. Soon after this, in the course of a week a cataract developed in the right eye, and the vision fell to 1/60, altho the tension was only 24 mm. Extraction was done, and two subsequent operations were necessary on account of a tough secondary membrane. All of these operations were extremely well tolerated by the right eye, which shortly before the date of report obtained vision of 5/4 part with correction. Entirely without medication, the tension of this eye had remained in the neighborhood of 20 mm. The left eye, from which the lens had also been removed, was retained, altho as a rather irritable eye the tension of

which was about the same as that of the right.

DISCUSSION.—C. E. Walker, Denver. In these cases it is desirable to operate early. In a great many of these subjects I believe the cause of the glaucoma is partial dislocation of the lens, which blocks the canal of Schlemm. I follow the custom advocated by Priestley Smith of Birmingham, of making a scleral puncture before doing the iridectomy, but at the same operation, so that the lens may be allowed to return to its proper position. If this is done systematically I believe we shall not get lenticular trouble following iridectomy, for one can make a broader iridectomy without damaging the ciliary body.

Posterior Polar Cataract.

W. C. BANE, Denver, presented a man aged 20 years, who had come complaining that for one week the central vision of the left eye had been defective. This he attributed to the glare of the sun on the ice while skating. He had been rejected for the army on account of poor vision. The vision of the right eye was 5/30, that of the left fair sized objects. The right visual field was normal, the left showed a central blind spot two inches in diameter at a distance of twelve inches. There was a posterior polar cataract in each eye, and floating opacities were seen in the left vitreous. The vision of the right eye was improved to 5/6 minus with minus sphere and cylinder, but the left vision was unimproved by lens, the opacity in this eye being larger and more central than that in the right.

Iridodonesis with Lens Opacities.

W. C. BANE, Denver, presented a man aged 62 years, who complained that following a fall downstairs in October, 1918, the vision of the left eye had been poor. There were some darting pains occasionally, but never any redness of the eye. There was a slight haze in the right lens, and a more dense opacity in the left lens. A distinct view of the fundus was not obtainable. The left iris was tremulous, and the

left lens moved slightly with movement of the eye. The vision of the right eye was 5/20, improved to 5/5 minus with lens. The vision of the left eye was of fair sized objects, not improved.

DISCUSSION.—C. E. Walker, Denver. These cases of tremulous lenses should be watched pretty closely. An immature cataract can be made mature and extracted, whereas a lens dislocated into the vitreous is hard to fish out.

Gonorrhreal Ophthalmia; Extremely Rapid Cure.

G. L. STRADER, Cheyenne, Wyoming, reported a case of gonorrhreal ophthalmia which had yielded with exceptional promptness to treatment. The man came into his office in the afternoon of January 14. There were large quantities of yellow pus, in which the gonococcus was found. The patient stated that the condition had only begun that morning. Eight per cent silver nitrat solution was applied to the inside of the lids, pulling the folds of the conjunctiva out with forceps, and then neutralizing with salt solution. The patient was sent to the hospital, and argyrol was used every two hours. The nurse subsequently reported that there had been no pus from two o'clock in the morning, and the patient was sent home in the morning of January 17 with only a slight redness of the conjunctiva.

W. H. CRISP,
Secretary.

AMERICAN ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Continued from page 294

Cervical Sympathetic Injury.

DR. HUNTER SCARLETT, Philadelphia, read for himself and Dr. Stanley Cobb, Boston, the report of the 11 cases seen in U. S. A. General Hospital No. 11, in which soldiers had suffered various lesions of the brachial plexus, cervical sympathetic, spinal cord. Enophthalmos was present in all cases, and ptosis in all but one. Miosis was present in

all but one. But there was hypotension in only five. Heterochromia was not seen in any case and facial hemiatrophy in only one. All were capable of normal vision. They conclude that: "Low lesions effecting the brachial plexus thru which sympathetic fibres run cause the most severe and typical Claude Bernard-Horner syndrome. Lesions involving the cervical sympathetic nerves, with complete or partial interruption, produce symptoms less severe, as a rule, than root injuries. Contusions of the cord result in the least pronounced phenomena, and are more prone to complete recovery than the first two conditions. Heterochromia iridis did not in adults occur following injury to the cervical sympathetic nerve. The pupils of the cases with root and nerve injuries did not dilate with cocaine; those of the cord contusions did dilate. The near point of the affected eye was less than its fellow eye in over 50 per cent of the cases, the average difference being slightly over 2 cm. It is difficult to draw any definite conclusion on this point, as the greatest variation was in a case of cord contusion, with only slight ocular symptoms."

DISCUSSION.—Dr. Edward Jackson, Denver, pointed out that this was the largest series of cases on record excepting operative mutilations of the sympathetic or operations in glaucoma. The increase of accommodation on the affected side seemed a fact of great importance.

Dr. Joseph Lichtenberg, Kansas City, had seen one case of this kind but with complete blindness from optic atrophy.

Dr. George F. Suker, Chicago, stated that Horner's symptom complex frequently follows difficult forceps delivery being usually temporary.

Dr. Wiener, St. Louis, showed slides illustrating the difference between the two eyes.

Insufficiency of Convergence.

DR. J. M. BANISTER read the paper published in full on p. 269.

DISCUSSION.—Dr. E. C. Ellett, Memphis: Testing the ability of the muscles

to overcome prisms, base out, does not give much information, since this trick can be quickly learned, and the prism adduction doubled or trebled in one sitting. The test I use most is the simple one referred to of measuring the near point of convergence with any small object, such as a pencil. If this is at 8 cm. or less, equivalent to a convergence of at least 12 M. A., I have not considered the case as one of convergence insufficiency.

My experience is that careful refraction, good judgment in prescribing, and attention to such matters as the general health, illumination and relief of ocular diseases, especially conjunctival irritation, has given relief when it was obtained. When these measures failed, no amount of muscle exercise, prisms or operations have succeeded in a sufficient number of cases to encourage a further trial of them. I have seen a number of patients with this and other muscle troubles without any symptoms at all.

Dr. Walter B. Lancaster, Boston, Mass. If you want to test convergence, let the patient look at some object and watch him and see how near he can get. We can judge that by the way the eyes act as they converge. If there is a plain manifestation of effort we can discount a little, otherwise we can add a little. The writer said nothing about general treatment. Most of these cases are rather neurasthenic or below par, and that sort of treatment is important.

Dr. Meyer Wiener, St. Louis: To my mind the writer has left out the most prominent or dominant symptom which occurs in this condition, sleepiness on close use of the eye. We find this in students who are not able to study because they go to sleep, and this symptom disappears when they stop reading.

Dr. Patton: I had the pleasure of seeing Dr. Banister work, and wish to emphasize the things he said. We have all been proud of the result he has been able to get in this work of muscle study and improvement; and the results obtained from this treatment by operation, for the correction

of these symptoms, have been great.

Dr. H. B. Lemere, Omaha, Neb.: I felt like Dr. Ellett, that if you have corrected the refraction you have reached the limit, and have to rely on that alone to correct and get rid of symptoms. However, after seeing a few cases Dr. Banister operated on, and the wonderful results, I have become firmly convinced that is a pathologic entity and we ought to be able to tackle it when we find it and not pass it by.

Dr. H. Turner, Pittsburgh: In our own practice it has been our custom to send patients first to a rhinologist for diagnosis of the condition of the accessory nasal sinuses, particularly the ethmoid sinus.

Dr. Luther Peter, Philadelphia: One of the practical methods I found in determining the convergence near point is the little electric lamp in the ophthalmoscope. You can determine the near point, and you can determine whether they can maintain the convergence for any length of time.

Dr. Banister, closing: I have in my time run up against very severe nervous conditions, owing to convergence insufficiency, and since 1898 have been using this method of operating on such cases, and I know I have gotten results in people who otherwise would have gone on to hopeless invalidism. Children not able to go to school, and after restoring their convergence they have been able to do good work in school. I believe in casting theory aside when we have practical illustrations and definite results in surgery. Sleepiness I did not mention, because we find that in all varieties of trouble in the eye. It is one of the first symptoms of commencing presbyopia.

Disturbances of the Heart and Liver by Low Grades of Astigmatism.

Dr. E. L. Jones, Cumberland, Md., stated that observations have been made on patients ranging from early childhood to almost senility, of the helpful or curative effect of exactly correcting astigmatism, alone or combined with other errors. This has been effective in the following conditions:

Vertigo; drawing or pain in the neck and shoulders, often extending the full length of the arm and hand; gassing stomachs; weakness of lower extremities, especially from the knees down; weak heart action or getting easily winded, when physical examination shows heart normal and persistently cold feet or extremities. These, with headaches, or sick headaches, are liver and heart symptoms; while nervousness, general depression of spirits and some other manifestations are sufficiently akin to hyper—and hypothyroidism and adrenalism, to suggest these states as the medium thru which symptoms are produced.

DISCUSSION.—Dr. Allen, Greenwood, Boston: In a previous paper of my own on "Ocular Vertigo" attention was called to the fact that vertigo was more commonly the result of errors of refraction than usually supposed, and it was particularly pointed out that the usual error in such cases was an astigmatism of moderate degree, with oblique axes, needing very careful fitting.

In the majority of these cases there were minor symptoms similar to those pointed out in Dr. Jones' paper, but they were so overshadowed by the primary symptom, which was in all cases cured or ameliorated by proper glasses, that no special mention was made of them. We are all indebted to Dr. Jones for pointing out the great necessity for a careful correcting of all astigmatic errors.

But I cannot agree with Dr. Jones' theory of the action of astigmatism on the liver, and the consequent causation of dizziness, nausea, vomiting and other symptoms of nerve exhaustion. The theory seems more likely, that dizziness and various nerve and stomach symptoms are the result of reflex nerve disturbances, produced directly from the nerves that control the eye muscles. I also would not ascribe the entire symptom complex directly to astigmatism, but would consider the eye strain as resulting from Nature's attempts to overcome defects but one of the contributing causes. In many cases it is perhaps the predominating cause, and

on its removal the patient is able to overcome other causes and proceed to a rapid recovery.

In view of the great number of people who have minor grades of astigmatism, and never have any symptoms, we must conclude that in cases where the eye strain precipitates trouble, the patient's body metabolism was in some way below normal; and that the relief of the eye strain is one of the measures for decreasing the overload which the body is trying to carry. The great lesson taught us by Dr. Jones is that heart and liver disturbances may be caused by the nerve overload, and may entirely disappear when all of the hidden astigmatism has been corrected and the proper axes found.

Dr. Lancaster: It is evident the idea that accommodation causes astigmatism is deep rooted. There is not time to go into that now, but would call Dr. Jones' attention to the method of getting the axis of astigmatism, and that is to use Dr. Green's astigmatic charts in the right way.

Dr. John Green, Jr., St. Louis: I have advocated their use on several occasions and wish to endorse what he says about securing the axis of astigmatism. It is astonishing how nearly accurately it can be done.

Dr. Lucien Howe: It occurred to me that when this is published there should be a protest from some member of the society as to the disturbance in the stomach, as directly related to some form of ametropia.

Another point is in regard to the position of the lens. I think that is too often overlooked. The position which is nothing more than the modification of Helmholtz and we should remember that a large percentage of cases do this thing, they tip them a little forward and a little out.

Dr. Spohn: To say a thing does not prove it. The essayist has a right to say a thing and anyone has a right to disprove the thing.

Dr. Jones. It is true that many cases of astigmatism do not present any symptoms. But when these symptoms do come they are probably the effect of the uncorrected astigmatism. Some

never have them until they have a serious sickness and then months after will say they never had their health since.

The Operative Treatment of Ptosis.

DR. WALTER LANCASTER, Boston, read a paper reviewing the classification of cases and the contraindications and indications for operation. He then reviewed the technic of the form of operation for ptosis, describing the anatomy and physiology of the parts and in detail three operations suited to different forms of ptosis.

DISCUSSION.—Dr. J. M. Wheeler, New York. There are so many different operations and the eye surgeon has so few opportunities, that he is not apt to get a large experience. We are indebted to Dr. Lancaster for placing a relative valuation on these things. In ptosis of not more than $\frac{3}{4}$ cm. the tarsus operation is satisfactory. The other operations are only partially satisfactory. As Dr. Lancaster said, the use of the frontalis is not entirely satisfactory, as the pull is not direct. The Hess operation is satisfactory; but the immediate effect is not the ultimate effect. There is a tendency for it to reduce as it goes on. It is possible and feasible to repeat the process if it becomes insufficient. This works very well.

His suggestion in regard to the use of fascia lata is good. In army repair work around the lids and face we became familiar with the use of the fascia lata. It is a satisfactory membrane to use, especially in the filling up of depressions. I have not used it in ptosis, but it would be warranted in young adults at least. Taking it is not quite as simple as he leads us to believe. In cutting down thru the skin it is easily found as a tense membrane, but the muscle tissue bulges in an alarming sort of way. After a strip is removed, one will wonder how to get the flaps together if he is not familiar with it. With chromicized catgut it is possible to get the fascia together.

Dr. Meyer Wiener, St. Louis: Let me make a suggestion which probably a great many are not familiar with. I find in suture operations on the lid

that a little pearl button, like a glove button, thru which to tie the stitches, is the best thing we can use. It is clean, easily secured, and the threads slide easily over the button.

Dr. Lancaster: Just a word of caution about the advancement of the levator; it is easy to overdo it.

A New Method of Advancement.

DR. MEYER WIENER, St. Louis, read a paper advocating a new method of Muscle Advancement, and reporting 11 cases in which it was done with gratifying result.

DISCUSSION.—Dr. Greenwood: I am able to get very good advancements without cutting any attachment but the conjunctiva. It is very simple and easily done. You have the conjunctiva cut with the muscle exposed, and a tuck in the muscle. At the top of the tuck, turn up the tendon and on each side fasten it down to the sclera; and you can lay the whole thing down and in three weeks the bunch is gone. At no time have you injured the middle fibres of the muscle, and these are brought forward close to the edge of the cornea and held down and I claim we have just as much advancement without cutting a bit of muscle or severing the muscle from the globe end without traumatism. I can do it in ten minutes. When you have it fastened with two sutures and tied tightly the muscle is not likely to pull out. There is no tension. Even should they do so you cannot lose anything. It is what I call combined tucking and advancement: and what is left of the bunch is very flat and soon disappears.

Dr. Hawley, of Chicago. I am glad to confirm Dr. Greenwood's method. At the Pittsburg meeting I described nearly the same thing. You can get almost any effect you want. I have done it with 45 deg. convergence or divergence. Make an incision over the tendon, you dissect back the conjunctiva as far as you want to go, holding it back with a modified lid retractor. You make a new attachment of the posterior part of the muscle to its tendon.

Dr. Ellett of Memphis: In regard to the use of the plate, for which I do not think Dr. Wiener claims originality, Dr. Savage has been using something of that sort for twenty years, where he uses the suture for muscle operations. It seems better to me to use the stump from which you cut the tendon, as in the Reese operation. You get a much more secure anchorage than with a suture which involves only the conjunctiva and episcleral tissues. It never seemed to me that it is good practice to tie a person's two eyes up for a week. It is not necessary.

Dr. Banister, of Omaha, called attention to the operation brought out by Dr. Valk of New York. Chromicized catgut should be used. Pass your needle down thru the incision to the episcleral tissue down to even the lower third, carry the needle around and over the muscle from below, and weave it in and out until you get the suture thoroly fixed so it cannot slip; and then take the other end and bring it down vertically thru the episcleral tissue to the attachment.

Dr. Wiener, closing: I have never seen a single case in which the stitches have pulled thru, but I have seen cases in which the conjunctiva stretched. In the early operations this was true because the stitches were not put close enough to the cornea. The similar plates of Savage were used for the muscle end and the severed end of the tendon; but not in the forward end where the muscle was to be attached, and that is the main issue in this operation.

Dr. Ellett said that theoretically it was right to make a weave, but practically it is difficult. But we do not weave in and out that muscle and tendon but once, and that is not difficult to do with a very small curved needle.

I have never found any serious objection to blindfolding a young person, and all these are done on young people. I do not think you can get the best effect without blindfolding them. Landolt always blindfolded his patients and kept both eyes shut a week. I do not keep them in bed, and they walk about

and talk to each other, and there is no serious objection as there would be in an old person.

As to not obtaining enough effect at the first operation. All you have to do is to pull on these threads and tighten them. The threads slip so easily. Even a slight overlapping will do no harm. It is startling how easily they will come forward. You have to use no effort whatever.

Simulated Brain Tumor.

DR. ROBERT SCOTT LAMB, Washington, D. C., reported a case in which the presence of choked discs, headaches, projectile vomiting, etc., indicated brain tumor probably involving the pituitary body, but without hemianopsia. Six weeks of organotherapy, luetin 2 grains, and posterior pituitary 1/10 gr. restored her to approximately normal condition which continued after more than four years.

Cyclodialysis.

DR. HARRY S. GRADLE, Chicago, read the paper published in this JOURNAL, v. 3, p. 41.

DISCUSSION.—Dr. Jos. Lichtenberg, Kansas City: The experience that I have had with this operation is so limited that I cannot speak authoritatively. I did the first one a year or two after Heine's article appeared. The result was not favorable and deterred me from using it in other cases. While in the Elschnig clinic in 1911, I performed a second operation with good results; and since then two others in which the results were only fair. Undoubtedly our cases were not chosen properly, according to the conditions outlined in Dr. Gradle's paper.

A possible indication for this operation, not mentioned in the paper, is where the anterior chamber is so nearly obliterated by the pushing forward of the lens and iris that iridectomy would be practically impossible. Here cyclodialysis could be employed to give ease or as a preparatory operation for a more radical one of iridectomy, corneoscleral trephining, etc.

It will be noticed, looking over the bibliography, that nothing has been written on the subject since 1915.

Possibly the war activities have had something to do with this, or possibly the operation is not being used as much as formerly, or after years of trial, judging from the indications for the operation as outlined, the cases for it fall within a limited field.

An Operative Procedure for Keratoconus with Report of Three Cases.

Dr. Green, San Francisco, California, read a paper on this subject. In the treatment of conical cornea the most successful procedures are those that reduce intraocular tension. In accordance with this view the writers reduce lid pressure by an external canthotomy and lower the intraocular tension by doing a modified Lagrange operation.

Of three cases operated upon by this method, vision in one case was 4/60 before operation and 4/10 after operation. In another case vision before operation was 1/30 and 4/12 after operation, and in the third case vision before operation was 4/30 and 4/15 after operation. (See p. 429)

DISCUSSION.—Dr. Banister, Omaha: I would like to ask why the Elliot operation, pure and simple, would not be sufficient. That is an ideal operation, and it seems in the modification there is more traumatism than in simply turning the anterior flap back and going in at the corneo-scleral junction.

Dr. Wiener: It is hard for me to accept the fact that the patient has only 1 D. in one meridian, and 5 D. in the other meridian in advanced keratoconus. I have never seen a case but needed a very high minus glass, and with a high astigmatism. I am not questioning the statement; but cannot reconcile it with my experience. One statement is that this method is the safest. It may be the easiest, but I claim my method is the safest, because I do not open the anterior chamber and subject the interior of the eye to risk or infection. It is, I think, a more difficult operation, but could be eas-

ily performed by any one with practice and experience. The result does not depend upon the reduction of tension at all, but on reduction of curvature. This may have to do with the results obtained by Dr. Green. He takes out a portion of the sclera at the upper border of the cornea which tends to pull the cornea flatter.

Dr. Blaauw. I think internal canthotomy should be done more than it is. What strikes me about keratoconus is that it is a self-limiting disease. You do not know when it is going to stop in its evolution; and I find it hard to make up my mind when to operate and when not.

Dr. Hawley of Chicago: I simply want to mention one case of conical cornea that is all hyperopic. I presume it was a case of high hyperopia and the change still left enough for a plus cylinder.

Dr. Green, closing: We use this to the exclusion of the Elliot or Lagrange for glaucoma operations. It is safer than the Lagrange because the eye is better protected; and than the Elliot, because with a trephine you are cutting down on the ciliary body without knowing how far you are going. If not, you are apt not to get the drainage. Five years ago we did nothing but the Elliot. But we now get better results with less reaction and we are much more certain of what we are going to get. Weeks has taken up the Lagrange operation to the exclusion of the Elliot.

Dr. Wiener was surprised at the amount of astigmatism of a hyperopic type. I was surprised myself. The patient came with astigmatism, with the hyperopia predominating. Dr. Wiener contends that his operation is safer, but his theory does not agree with ours. He would increase the intraocular tension by making the eyeball smaller, while our process is entirely opposite, to reduce the tension and cause the thin portion of the cornea to regenerate if possible.

ABSTRACTS

M. Straub. Ocular Inflammations, Caused by Resorption of Lenticular Substances in the Ocular Lymph. Illustrated with 56 photographs of sections. A posthumous work of Prof. M. Straub. Edited by his assistants "as a token of gratitude toward their teacher."

Prof. Straub had intended this work to be part of a larger one, which would include a chapter on glaucoma. His early death prevented its completion.

For years he possessed sections of eyes, which had suffered from inflammation, the result of resorption of lens substance thru an opening in the capsule or some other way. Such eyes seemed rare, but helped to explain a much larger number of conditions than was at first supposed.

Knowledge of the bacterial world led physicians to consider every inflammation of importance as due to living organisms. Only in later years the view revives that practically important inflammations can originate without infection. Straub would demonstrate that the inflammations caused by lens substance are not merely hypothetical. Ophthalmologists know well the injurious influence of absorbed soluble lens substance, as shown after cataract extraction, in traumatic cataract, after spontaneous resorption of a senile cataract, and after dislocation of the lens.

The work is divided in three chapters: phacogenetic inflammations after extraction and traumatism, after dislocation of the lens, and after spontaneous resorption of a senile cataract.

If observation has demonstrated that large quantities of lens substance can produce chronic and even acute inflammations, then we may surmise that very small quantities, absorbed during a long time, can exercise a slight but continuous irritation. This can lead to accept a phacogenetic origin of glaucoma.

The first observation was in a 50 year old man, who had a zonular cataract; which was operated on without iridectomy, while much clear cortex re-

mained behind. There was much post-operative irritation, which necessitated two punctures to remove the swollen cortical mass. The eye was quiet two months later, $V. = \frac{1}{3}$. The second eye was operated on a few days later. As much cortex remained behind, but hardly any reaction occurred. Did the lens substance absorbed in the first eye produce an immunity for the second?

Some months later a lady, 56 years old, with ripe cataracts, brown nuclei covered with a thin layer of grey, probably shrunken cortex, underwent a preliminary iridectomy in both eyes. L. healed normally. R. had a long, very painful reaction. Here the lens capsule had been wounded. After failure of the commonly used means, injection subcutaneously in the arm, of a suspension in Na. Cl solution of pig lens changed the condition after 4 days. The eye became gradually quiet. This does not prove that the favorable turn must have been caused by the injection of the lens substance. It may be that accidentally the capsule had closed with halting of the inflammation. If the pig lens had an influence the suppression of the reaction thru the formation of the immunity must have caused closure of the wound of the capsule. Removal of the lens would also have stopped the inflammation.

Not only the senile cataractous lens but also the normal senile lens can produce such an inflammation. A man 72 years old, was operated on by iridectomy for glaucoma simplex. He returned after 5 months with the eye sensitive since some weeks, redness, vesicles in the corneal epithelium, spots on Descemet's membrane, vessels in the iris, posterior synechiae. Treatment was without success. The eye had to be enucleated. A small tear in the capsule of the lens was found, with the route of the knife in the lens substance; from which wound traumatic cataract had formed. Infection can be eliminated on account of the time, and on general microscopic grounds.

The diagnosis could have been made, if the growth of the cataract had been followed, with the decrease in the depth in the anterior chamber. The extent of the fibrinous precipitates at the back of the cornea are surprising; and also the vesicle formation in the epithelium of the cornea, which is rare in the usual cases of iridocyclitis.

The name iridocyclitis for this process is wrong. The marked infiltration with leucocytes in the iris is distinctly secondary. The solution of lens substance was absorbed by the iris, and this produced the infiltration. The ciliary body furnished the exudation cells, which moved from it to the places of strongest concentration of the lenticular poison. We are dealing with an endophthalmia from a chemical cause. The toxines came from the wounded lens. The disease could be named *Endophthalmia Phakogenetica*.

A tear in the anterior lens capsule can give symptoms of cyclitis, and of the posterior capsule those of hyalitis, not very pronounced, as the fibrinous exudation in the anterior chamber, and the corneal edema, which we find usually with hyalitis are absent. High tension, however, is present.

Spontaneous tear of the lens capsule can occur and produce an endophthalmia phakogenetica. Recognition of this condition will save the eye thru extraction of the lens. We find exacerbations and remissions in the course of the inflammation, which does not yield to the usual remedies, the cornea is very opaque and specially large precipitates are present on Descemet's membrane; the corneal limbus is much swollen thru infiltration. Tear in the capsule is not so rare without known trauma. It is not improbable that the capsule of a cataractous lens is less resistant.

We have seen that in old people the lens substance, in soluble form in the ocular lymph, can form a poison for the eye, the cataractous lens as well as the normal, which thru a tear in the capsule has become opaque. This poison produces inflammation, the intensity of which depends on the quantity, which is absorbed. After extraction and dis-

cession of secondary cataract usually the small quantities do not produce important reactions. If, however, the entire lens is still in the eye, and large masses of lens substance are dissolved in the lymph thru damage to the lens capsule, inflammations of a dangerous nature arise.

When the tear arises in the anterior capsule the inflammation becomes localised chiefly in the anterior part of the eye, and there is danger that one will be satisfied with the diagnosis iridocyclitis. A tear in the posterior lens capsule produces exudates in the posterior part of the eye, which favor the diagnosis hyalitis and is only distinguishable from hyalitis thru the slight reaction of the induced inflammation in the anterior part of the eye.

Blind, enucleated eyes, which had become painful after a long period of rest, will show that the continuous degeneration has made the capsule permeable, and the absorbed lens substance has become the cause of the irritative phenomena. This ought to be inquired into.

Resorbtion lymphocytosis arises when milder irritative toxins are absorbed in the ocular tissues. The lymphocytes are found especially before the posterior layers of the iris; and also in the anterior layers, when the process has lasted a long time. They are also found in the ciliary body in a small triangle near the anterior border of the ciliary muscle around the vessels; and also in the choroid at the ora serrata. In the other parts of the choroid are found, here and there, small foci of infiltration, as observed in sympathetic ophthalmia. Infiltrations were found around the vessels of the retina and optic nerve, and around the perforating vessels of the sclera, leading toward the limbus, and also in the loose tissue of the limbus itself.

These infiltrations demonstrate that the products of tissue resorbtion have concentrated at these places and have attracted leucocytes. The origin is found in the lens, which has reached the age, at which it can give off toxic material and which is partly dissolved. Nobody doubts that the dissolved sub-

stance can pass the intact lens capsule. What clinically was called phthisis bulbi dolorosa may be thus explained. The pains should then be relieved by removal of the lens. The condition of the retina is such that perhaps the eye would retain some function.

Straub found that Fritz Ask had recognized the phlogogenetic influence of the luxated lens. It is well known that the luxated lens can be tolerated in the vitreous in some old people. However, in the plurality of the cases the eyes with luxated lens show signs of inflammation, sometimes localised near the lens, sometimes at greater distances. Ask finds that the inflammatory signs are much more pronounced when the capsule is torn.

Some cases of resorption of a senile cataract occur without disturbance. Mostly, however, accidents follow, or a severe inflammation or glaucoma. Straub had occasion to examine three such eyes. The diagnose of resorption of the lens was not made *in vivo*. Microscopic examination made it clear that the sensitiveness of the phthisic eye was caused by absorbtion of lens substance in the ocular lymph. One case showed also atrophy of the iris, which Straub considers was caused by the lens resorption.

Straub sums up thus, after a general survey of the localisation of exudate cells in inflamed eyes: When in an eye weak toxins are gradually absorbed, there appear in definite parts of the eye, infiltrations with mononuclears, usually called plasma cells. In the choroid an infiltration occurs in the region of the ora serrata; in the ciliary body at the anterior surface of the ciliary muscles; and around the retinal veins. The largest part of the choroid remains free.

This resumé cannot do justice to Straub. The entire article is written in his usual clear style, and is full of important deductions and pathologic microscopic observations. We deplore once more the untimely death of this lucid observer, which deprives us of a most instructive chapter of the causa-

tion of glaucoma thru absorbtion of lens substance in the eye.

E. E. B.

Guglianetti, Luigi. Action of Bacterial Toxins on Cicatrization of Wounds of the Eye. Archivio di Ottalmologia, Sept.-Oct., 1919, v. 26, p. 181.

The author, in an extensive work, attempted to reproduce experimentally the conditions in which a wounded eye is exposed to bacterial toxins, both when these are absorbed from foci elsewhere in the system, and when their action is local. He reviews the work of Tornatola on wounds of the eye, and of Del Conto, Lettieri and others on wounds of other regions, when exposed to toxins.

The author practiced on rabbits three kinds of aseptic wounds: corneoscleral trephining, iridectomy, and the Saemisch corneal incision. Toxins were given in one series, systemically by the subcutaneous and intraperitoneal routes, for some days before and after the wound was made. In another series the toxins were instilled in the conjunctival sac or injected subconjunctivally. Eyes were enucleated 2, 4, 7 and 16 days after the wound, and the progress of repair determined in sections. Controls were made by inflicting the same wound on the other eye at a different time, and sectioning it after the same interval. Fourteen experiments with diphtheria toxin were made, 8 with a toxin from *B. typhosus*, and 7 with the toxin of virulent streptococci.

RESULTS.—In the cases where toxin was given systemically, the eyes showed no greater local reaction than the control eyes. In the most severely intoxicated animals, a slightly retarded cicatrization was observed, which the author attributes to the general trophic changes produced by any such debilitating condition. It was most marked with diphtheria toxin.

Where toxins were given locally, extensive changes were seen, especially with diphtheria toxin. Violent conjunctivitis, keratitis, and iritis occurred, with necrosis of the conjunc-

tiva and of the cornea near the wound. Repair, when it finally began, was slow and irregular. With the typhoid and streptococcus toxins, reaction was much less marked, but there was definite inflammation and retarded cicatrization.

S. R. GIFFORD.

Marin Amat. The Marcus Gunn Syndrome or Phenomenon. Ann d'Ocul., 1919, v. 156, p. 513.

The author reports a case of associated movements of the upper lid and the jaw, the first he had seen, and illustrates his text with three photographs showing this association. The patient, female, age 18, for the first few days after birth was unable to open the right eye, and also presented a capillary angioma on the right jaw. These were attributed by the attending physician to birth injury. The condition remained the same for two years, and only at the first attempts at mastication was a movement of the lids noticed, there being an exaggeration of the normal action of the levator. There has been no change up to the present time. There is a ptosis of the right upper lid which persists except when the patient talks, masticates or opens her mouth widely. The case differs from the most of the cases published in ptosis, and in a paralysis of the superior rectus. The author refers to his case, previously published, of an "inverse Gunn syndrome," i. e. voluntary closing of the eye causing an involuntary opening of the mouth. Amat concludes that the superior branch of the motor oculi contains fibers derived from motor part of the trigeminal, or the nerve of mastication. In certain animals this synergism is necessary, but even when these fibers are rudimen-

tary, as in man, they may develop when necessary, as in a case of ptosis, and perform a supplementary rather than a synergistic function. The anastomosis between the third nerve and the nerve of mastication is a peripheral one. We know that the motor oculi frequently receives, in the orbit, a branch from the ophthalmic nerve or its nasal branches. Altho these probably contain no motor branches, it proves the possibility of other anastomosis, i. e., with the trigeminal.

By this theory, he explains the cases without ptosis, or where the latter occurs, wherever its origin. Cure is often obtained by perfecting isolated movements of the lids, the latter finally obeying the will, and freeing itself from the association which binds it to the movements of mastication.

C. L.

Kalt, Restoration of Lid by Means of Flap with a Double Surface. Ann. d'Ocul., 1919, v. 156, p. 571.

The author describes this procedure in the case of a soldier who had lost the entire upper lid and eyeball. A rectangular flap was outlined on the forehead by two vertical parallel incisions; and a dissection was made in the form of a bridge. The flap was replaced for one day to permit hemostasis. Then a large deltoid epidermal graft was placed beneath this, the lower face upward, and the lips of the two incisions incompletely sutured, and left for twelve days. Then the flap was severed by a superior horizontal incision, and the usual Indian auto-plastic operation performed. The result was very satisfactory—a thick lid with double epidermic surface.

C. L.

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REPORTS OF RARE PATHOLOGIC CONDITIONS

The value of careful reports of rare pathologic conditions may be in either of two directions. It is always worth while to extend the boundaries of scientific knowledge, for we can never know when an isolated observation upon a rare condition may throw light on problems of great practical importance. Scientific knowledge is like a dissected map, in which a number of pieces may be examined without showing any relation to each other; but when a certain connecting piece is found it shows the proper relations of all the others. So the discovery of some new fact in pathology, trifling and unimportant in itself, may give significance to observations that before had no practical importance.

It is also important, from the practical side, to have exact and complete accounts of every rare condition, simply because it is rare. The individual oculist may not meet with more than one or two cases of a certain kind in a life time practice. When he does meet such a case he will be unable to

advise his patient, unless he has already become acquainted with the condition through the literature. But if he has it in mind, from reading a good description of it, or knows where such a condition would be described by those who have encountered it, he can quickly find out the significance of what he has observed, and advise his patient intelligently.

The importance of such reports is illustrated by the cases of iris cyst mentioned elsewhere in this number. A young oculist recognized the resemblance to sarcoma, and called a colleague in consultation. He agreed that the appearances must mean sarcoma, threatening the vision and life of the patient. A most experienced consultant saw the case, and could not suggest any more probable diagnosis. But both eyes seemed equally involved. One could not urge the enucleation of two seeing eyes, and a tentative iridectomy, in hope of removing the growth from one eye and deciding its character, was rejected by the patient. Four years observation of the case, brought the conviction that the condition was not sarcomatous but cystic.

This case was reported, but it did not get wide enough circulation. Fifteen years later one of the most competent ophthalmologists in the North of England encountered a similar case. He made the diagnosis of sarcoma of the iris, and called in consultation one of his best informed colleagues of London, who concurred in the diagnosis. Only one eye was affected and next day it was enucleated. The microscope showed the condition to be that of simple nontraumatic cyst; and relatively harmless. If the English ophthalmologists had read the report of the American case, it might have raised a doubt of which their patient would have had the benefit.

There are many conditions so rare that not one ophthalmologist in a thousand will meet them until some patient comes to him with something of the kind, trusting to his competence to give the best advice possible. Then, if the condition has been well described in the literature, and the man who announces himself as a specialist in eye diseases, is properly acquainted with that literature, so that he can hunt out and study the best description of this and allied conditions, the patient will get the benefit of the experience of the whole profession with reference to his malady.

That is the justification for the reports of the rarest cases, that may occur in the practice of anyone. Such reports should dwell on the clinical aspects, the appearances and course of the case, with minuteness of detail that will serve the whole profession in lieu of particular clinical experiences.

E. J.

THE NEW ORLEANS MEETING

The scientific proceedings of the Section on Ophthalmology of the American Medical Association will be published in its transactions and in the Journal of the A. M. A., and elsewhere. But certain occurrences connected with its meetings, and not included in those proceedings, are of sufficient interest to mention here.

The number of members registered in

the section was nearly 300, a larger number of ophthalmologists than ever attended an international ophthalmological congress except one. But this attendance has been exceeded in previous years; just as the general attendance on the A. M. A. has been larger in cities more favorably situated than New Orleans. Doubtless there will be a larger attendance next year at Boston. For this section is, from year to year the largest body of men interested in ophthalmic science that assembles anywhere in the world.

A pleasing incident of the meeting occurred when Dr. Parker of Detroit took the platform, while his friend, Dr. Ellett of Memphis, diplomatically got Dr. de Schweinitz of Philadelphia out of the room. Then Parker told the Section that there was mention of de Schweinitz for the Presidency of the A. M. A.; and that the election would occur next day. It was eminently proper that the members of the Section who would best know the abilities of their colleague, and the efficiency and grace he would bring to the office: and his eloquence and good judgment as a public speaker, should speak to delegates from their respective states of these matters.

In view of the fact that of late years no one has been elected to this office who has not been a leading candidate the year before, it was not unsatisfactory to learn next day that the vote stood, Work, 68, de Schweinitz 50. It might be unfortunate to have the A. M. A. split by rivalry among the Sections for its chief offices; but it would be quite as bad to establish a custom of confining these offices to the heads of the Public Services, and the men active in two or three sections. The good of the Association requires that the ophthalmologists present their proper claims.

An incident of different character occurred when Dr. Howe called attention to the utterly deplorable state of members of our profession in Vienna, as shown by letters from Professor Dimmer, and revealed thru other channels. Dr. Howe offered to transmit to Prof. Dimmer any relief funds that

might be placed in his hands; and a subscription paper drawn up and circulated soon bore the names of 35 or 40 prominent members of the Section. Such subscriptions may still be sent to Dr. Howe at 520 Delaware Avenue, Buffalo, N. Y. The sum raised will be sent as certificates by means of which the holders can draw on the food supplies established by America in Vienna, for the relief of the starving victims of military ambition and national folly.

The officers for the Section chosen for the coming year are: Chairman, James Bordley of Baltimore; Vice-chairman, Marcus Feingold, New Orleans; Secretary, George S. Derby, of Boston; Member of the House of Delegates, Lee M. Francis of Buffalo.

Dr. Hiram Woods, being ineligible for a third successive term, Dr. Albert E. Bulson, Jr. of Fort Wayne, Indiana, was chosen to represent the Section on the American Board for Ophthalmic Examinations.

E. J.

A NEW JOURNAL

The field of physiologic optics furnishes a large part of the basis for the practical work of the ophthalmologist, and has large interest for the physicist, the physiologist, the optometrist, and the manufacturing optician. In the wide domain of ophthalmology it offers the best opportunity for specialization in journalism. There are many questions that interest different groups of workers, the discussions of which by members of different groups from different viewpoints must be of great advantage. The appearance of a new journal devoted to this especial field is therefore to be welcomed.

The new venture, called "AMERICAN JOURNAL OF PHYSIOLOGICAL OPTICS," is edited by Charles Sheard, A. M., Ph. D., and published by the Research Division of the American Optical Company. The first number bears the date, January, 1920, altho considerably delayed in its appearance. It is to be issued quarterly. It is well printed on good paper, with clear, pertinent illustrations. We congratulate its sponsors on such an auspicious beginning.

By the contents of the first number we cannot judge its ultimate value to science. But we can see the direction in which it starts out; and if it holds to this course and receives the proper support, it will be both creditable to American Science, and useful to all who make ophthalmology their professional work.

After a couple of editorials setting forth the purpose of the publication, comes a historical paper on "Thomas Young, the Father of Physiological Optics," by the Editor. Next we have "Eyestrain in Relation to Occupations," by George M. Gould. "A Comparison of Photoelectric Cells and the Eye," W. W. Coblenz; and "The Value and Limitations of Perimetric Methods of Study," by Luther C. Peter, complete the department of original papers.

Under Abstracts and Reviews are given two excellent condensations of papers published in this Journal by Dr. Howard on "A Test for the Judgment of Distance," and by Dr. Lloyd Mills on "The Effects of Faulty Craniospinal Form and Alignment Upon the Eyes." We shall be glad to reciprocate by presenting in abstract some of its original papers; and welcome this Journal as a collaborator in its chosen field of usefulness.

E. J.

BOOK NOTICES

Syphilis und Auge. (Syphilis and the Eye) von Prof. Dr. Josef Iggersheimer, Goettingen. 8vo. 625 pages. 150 illustration, some in colors. Berlin, Julius Springer, 1918.

Few of the books of recent years possess such eminently scientific and practical value to the ophthalmologist; and, resulting therefrom, such importance to his patients as *Syphilis and the Eye* by Iggersheimer. Too often has the specialist been taunted with the frequently only too well merited reproach, that his syphilitic patients are not thoroly treated. This and the tremendous changes of the last ten or fifteen years in our views of syphilis, and in the principles guiding its treatment, prevention, diagnosis and prog-

nosis, make revision of the whole question, in all its aspects, of great import to the physician already in practice. The book before us answers the purpose admirably.

Tho reflecting thruout the literature of its subject, it does not contain a dry and disjointed enumeration of quotations; but bears the individual stamp of the author who on almost every phase of the subject has the right of his own opinion based on clinical and laboratory experience. A more thoro cross-index and an English translation would greatly increase its field of practical influence; tho the research worker will be somewhat hampered by the fact that the non-German literature has been worked into the book less than might seem desirable. An edition condensed to about one-tenth of its present volume, prepared by the author himself or under his supervision, would contain all the essential data and would make them at once available to the general reader.

Over 100 pages are given over to a general discussion of syphilis. The pathology of syphilitic infection, the rôle of the treponema and a review of experimental syphilis open the chapter. The diagnostic and prognostic values of the Wassermann reaction, of the different tests on the spinal fluid, of the luetin reaction, of animal inoculation and of serologic family study are analyzed. Hereditary syphilis, in all its aspects, the prophylaxis and the evaluation of the different modes of treatment close this general part.

The greater part of the book is naturally devoted to a systematic discussion of the syphilitic manifestations in the different parts of the eye. From the abundance of important statements only one here and there can be gleaned for the space allotted to this review. A critical study of experimental eye syphilis in animals leads the author to the conclusion that the disease in animals is different from that in man owing to the mode of infection (large quantity of infecting material introduced into the animal), and to the different reactions of the animal and

human organisms; because of the adaptation of the treponema to the human host, acquired during many centuries. In spite of this, valuable data have resulted from animal inoculation regarding parenchymatous keratitis, iritis, choroiditis and optic nerve atrophy.

In the chapter of lid and conjunctival affections the fact is emphasized that it is often impossible to decide whether a given lesion is of secondary or tertiary character. Existing eye affections predispose to a primary lesion on the eye. The various manifestations are discussed and valuable hints given as to diagnosis and treatment. When dealing with dacryocystitis the possibility of a syphilitic etiology is always to be considered, both in the young and in the adult.

Parenchymatous keratitis occupies about 80 pages and here features of the disease are discussed that are hardly ever found in textbooks. Keratitis parenchymatosa is almost purely an effect of the treponema in the fetus and in the new born; in later life a specific altered reaction of the cornea predominates more and more in the production of the clinical picture. The author is inclined to doubt a tuberculous etiology of the keratitis, a positive Wassermann having been found in nearly all the cases. While the keratitis is rather little influenced by the antisyphilitic treatment, we are reminded that treatment must not consider the corneal affection only; but it must above all be directed against the underlying general condition.

Iris and ciliary body are equally well handled. Luetic iritis is said to relapse only rarely. Almost all eyes with syphilitic retinitis have had an iritis. Choroid and retina are treated in the same chapter because of the difficulty, even anatomically, to decide which was primarily affected; an isolated affection of the choroid can occur tho, and primary affection of the retina exists. The various forms of affection due to acquired and congenital syphilis are described. The appearance of the salt and pepper fundus is clearly explained by its histology. Vascular affections

of all kinds are typical of syphilis. Proliferating retinitis is less frequent than in tuberculosis because of the relative rarity of hemorrhage in syphilis. The question of an etiologic relation of syphilis to glaucoma will only be solved by systematic examinations.

Ocular neurosyphilis is dealt with in a chapter of 220 pages of which a great deal of space is devoted to syphilis of the central nervous system, its pathology, diagnostic, prognostic and therapeutic features. Tabes and progressive paralysis get full consideration. This is followed by a systematic survey of optic nerve affections, i. e. neuritis, choked disc, atrophy. The newer method of field examination in which the test object is carried perpendicularly to the direction of the nerve fibers in the retina gives earlier and more valuable information than the older way. In true optic neuritis a disturbance of adaptation may be found, not in pure choked disc.

Pupillary disturbances receive special consideration. Motor nerve affections are shown in their relation to cerebral lues, tabes and congenital disease. Trifacial affections and nystagmus conclude this chapter which, because of the many fine points raised and the many case histories illustrating them, makes every attempt at review appear hopeless. One leading thread runs thru the whole: the use of all diagnostic means as the only hope for successful treatment, which is to arrest destruction of valuable nerve tissue and to cure the underlying general cause. A chapter on orbital affections and one on syphilis and blindness close the book. Mention should be made of the 150 excellent illustrations in the text of which many are printed in colors, a style more extensively used of late, and worthy of wider imitation.

M. FEINGOLD.

The American Encyclopedia and Dictionary of Ophthalmology. Edited by Col. **Casey A. Wood**, M. R. C., U. S. A., M. D., D. C. L. Assisted by a large staff of collaborators. Vol. XVI, pp. 12,009 to 12,800. Fully illustrated, Chicago, Cleveland Press.

This volume carries the work from Solution, Dobell's to Toxic Amblyopia: and makes it probable that two more volumes will complete it. Probably the most important article in this volume is the one on Sympathetic Ophthalmia, 48 pages, by Dr. Harold Gifford, of Omaha, to which is appended a bibliography of 15 pages prepared by Dr. Frank Stockman of the Library of the Surgeon General, Washington, D. C. Dr. Gifford has dealt with the subject from all points of view, and has produced a monograph that is especially practical, yet brings to its support the latest findings of scientific investigation and discussion. There are extensive footnotes, which with the bibliography are in fine print, making this the largest complete article in the volume. The section on the Stereoscope, by D. W. Wells of Boston, occupies 68 pages, but is freely illustrated; and the section on Toxic Amblyopia, altho occupying 81 pages is not completed in this volume.

Next in length to the above is the section on Syphilis of the Eye by John A. McCaw of Denver. It fills 36 pages, and is illustrated by the color plate taken from the January number of this Journal. It must be regarded as supplementing, and supplemented by, the 19 other sections of the Encyclopedia, to which it refers, and which deal with particular parts of this general subject.

It seems proper at this time again to notice the enormous amount of work that its Editor is putting on the Encyclopedia, and the large share his work has, in making this the most valuable reference book on Ophthalmology that has been printed. The important brief notices, one line to ten pages, that come from his pen to make up the body of the work are innumerable; at least we believe no one has yet tried to count them. But in this volume alone there are eight articles varying in length from 11 to 33 pages, that, being unsigned, must be credited to him. Let us see what are these "unconsidered trifles" that he has snapped up.

The longest, 33 pages, is on "Teaching Methods in Ophthalmology." It gives not only a full history of recent

movements regarding medical degrees in ophthalmology, but also takes up the methods and machinery of ophthalmic pedagogy. Next comes "Speculum," 29 pages, fully illustrated. Then there are 20 pages devoted to "Sport, Ocular Problems in," that will enable the careful reader to give assistance to some of his best patients, in matters of which they can scarcely get an understanding except from the qualified expert. Under "Strabismus," 19 pages are given, bringing up to date the subjects of "Ocular Muscles" and others dealt with in earlier volumes; "Test Charts," 15 pages, "Sporotrichosis of the Eye," 13 pages, misplaced after sport, "Tabes Dorsalis," 12 pages, and "Tonometry," 11 pages, complete this list.

We may mention also an 8 page account of "Syndromes," that will often prove convenient. Most syndromes are named for their supposed discoverers; and it is hard to remember their significance and often very difficult to find any account of them in text books. As one uses the Encyclopedia he finds himself turning more and more frequently to it, to settle doubtful points and clear up his indefinite impressions. The great advantage of having information brought under one definite arrangement becomes manifest as this work approaches completion.

E. J.

Transactions of the American Academy of Ophthalmology and Otolaryngology. Clarence Loeb, Editor, 1919.

Of the eighteen ophthalmologic articles, four titles deal directly with war service and of the balance most refer to experiences therein. Of the thirteen otolaryngologic articles a number likewise show evidence of Military Service. Therefore our Association was not only largely represented in the Army but likewise the members were interested in scientific work.

Of special importance in these proceedings are the articles by John Wheeler, "Free Dermic Grafts for the Correction of Cicatricial Ectropion," that by S. Hanford McKee on "Epith-

elial Inlay and Outlay in Lid Repair" and that of Joseph C. Beck on "Plastic Surgery," all of which show results of Army experience. The "Operative Treatment of Ptosis" by Walter B. Lancaster is a classic. Several new or nearly new operations for "Muscle Advancement" are described by Meyer Wiener and an "Operation for Keratoconus" by A. S. and L. D. Green. A number of new procedures are described in the ear and throat section.

Alphabetical directories of names and addresses by states are given. These are presumably correct, but some Army titles are incorrect. There are some misspelled names and ancient addresses. A really up-to-date and correct list is a difficult feat only to accomplish and probably impossible by the busy editor of our transactions.

Quite a number of these papers should be republished in Journal form for it is the lot of Transactions in book form to be buried in the library shelves and not referred to, whereas Journal articles are usually more completely read and remembered.

H. V. W.

Transactions of the Ophthalmological Society of the United Kingdom for 1919, vol. 39, pp. 496. Illustrated with 10 plates and 31 figures in the text. London. J. and A. Churchill.

This volume includes papers presented both to the Annual meeting of the society, 28 in number; and those presented to affiliated Societies as follows: The Oxford Ophthalmological Congress, 6. The Midland Ophthalmological Society, 8. The Irish Ophthalmological Society, 13. The Ophthalmological Society of Egypt, 6. Only the North of England Society is not here represented. It can fairly be said that in general the character and quality of the papers furnished by the different societies are much the same.

The Bowman Lecture by V. Morax on Plastic Operations, the discussions on Visual Requirements of Aviators, and on Eyesight in Connection with Education, and the Doyne Memorial Lecture on Preventive Ophthalmology by J. H. Parsons, together occupy

about 125 pages. The other 53 papers are comparatively short, averaging something over 5 pages each.

The preceding volumes of these "Transactions" have been notable for the large number of short papers, mostly condensed case reports, that they contain. Scarcely any case occurs in practice that cannot be approximately matched by some case to be found in these pages. It is to be regretted that a larger number of English speaking ophthalmologists do not have this series at hand for frequent reference.

The illustrations are good and greatly supplement the text. Two of the plates representing fundus conditions are printed in colors. The others represent sections or macroscopic specimens of pathologic conditions. The volume is a worthy and welcome addition to our literature. E. J.

Transactions of the American Ophthalmological Society. Fifty-fifth Annual Meeting. 1919, v. 17, 741 pages. Illustrated by 24 plates, 10 in colors, and figures in the text. Philadelphia. Published by the Society. T. B. Holloway, Secretary.

It is only three years since the society ventured to devote a whole volume to each year's transactions; but the present volume is about as large as any of its predecessors containing the proceedings of two or three annual meetings. This doubling of the size of the annual transactions is largely due to the publication with them of theses, prepared by candidates for admission to the Society. Of these there are six, occupying 278 pages. It is clear that the requirement of a thesis, for admission, has been an important stimulus to the production of excellent, albeit rather long papers, by some of the younger American ophthalmologists.

The titles of these different theses, and their authors are: Persistent Posterior Fibrovascular Sheath of the Lens, Dr. Francis Lane; Antidiphtheritic Serum in Severe Ocular Infections, with Special Reference to Hydropyon Keratitis, Dr. Ben Witt Key;

The Eye in Hereditary Syphilis, Dr. John Green, Jr.; Diagnosis and Treatment of Luetic Involvement of the Optic Pathways, Dr. Mark J. Schoenberg; Military Ophthalmology, Dr. Lloyd B. Whitham; Vernal Conjunctivitis, Dr. W. H. Luedde.

This volume is especially notable for the number and excellence of its colored plates, in which it excels any preceding volume in its series; and any contemporary transactions of any ophthalmological society in the world. There are 10 of these plates, of which 3 are reproduced thru the courtesy of the Medical Bureau of the British War Office, one from this journal; and others, including two of charts of color fields, and of various ocular conditions, are original with these transactions.

These plates are of great educational value. In this day of better training for those who practice ophthalmology, it is to be hoped that this society will take active steps to bring its valuable transactions to the notice of a much larger proportion of those engaged in this special line of practice, to the end that it may find its proper place in the library of every American ophthalmologist. E. J.

Dynamic Skiametry and Methods of Testing the Accommodation and Convergence of the Eyes. By Charles Sheard, A.M., Ph.D., 112 pages. Illustrated with 18 diagrams. Chicago. The Cleveland Press.

This is reprinted from volume XV of the American Encyclopedia and Dictionary of Ophthalmology. In his "Foreword" the author expresses the hope, "that it will call attention to the desirability—if not the necessity in most cases—of making various dynamic as well as static tests upon a pair of eyes." "It does not follow that a satisfying of the static demands of a pair of eyes will likewise afford a sufficient relief of, or aid to, these eyes when they are accommodating and converging." "It, therefore, behooves every practitioner upon the eyes to engage in tests which may be classed as dynamic as well as those known as static."

All who are engaged in measuring eyes for glasses, and have sufficient intelligence and knowledge for that service, will do well to obtain this book and study it, if they have not already become acquainted with its contents in the Encyclopedia. E. J.

Bulletin de la Société Belge d'Ophthalmologie. No. 40. Analytic Report of the Meeting of November, 1919. 101 pages, 6 halftone plates, Brussels, 1920.

The appearance of this number marks the full resumption of the scientific activities of the Belgian Society of Ophthalmology, which had for many years, prior to 1914, been one of the important sources of the better grade of practical ophthalmic literature.

This number contains 19 papers, an average of 5 pages to each, and throughout they preserve that direct practical character, which makes them of high value and interest to the practitioner of ophthalmology. They have been given to our readers in abstract p. 361 of this Journal. Included among them are three by French leaders in ophthalmology, de Lapersonne, Landolt and Lagrange. Prof. Nuel of Liége in his introductory remarks welcomed the presence of these men as a sign of the closer association of France with Belgium in the pursuit of science.

The list of members here published gives 114 names of whom 42 were registered at this meeting. There are also included portraits of two deceased members, Arens and Marzorati, with brief accounts of their principal achievements. E. J.

Transactions of the College of Physicians of Philadelphia. 3rd Series, vol. 40, for 1918. 308 pages, illustrated. Philadelphia. Printed for the College.

In this volume the proceedings of the Section on Ophthalmology occupy 46 pages, while the two other sections represented use but 11 pages. The scientific proceedings of especial interest to ophthalmologists are already accessible in the pages of this Journal.

Textbook of Ophthalmology. Paul Roemer. Director in the University

of Greifswald. Third Remodeled Edition. 496 pages with 297 illustrations in the text and 32 colored plates. Urban and Schwarzenberg. Berlin and Wien, 1919. 30 M.

Roemer's well known book has been so favorably received that, within 8 years, 3 editions became necessary. Differing from the general rule pursued in textbooks that each succeeding edition shows an increase in volume over the former, this one followed the opposite course by decreasing from 1028 to 828, and now to 496, pages. By this condensation the new edition has by no means lost in value, but greatly gained in practical usefulness.

This work excels in clear exposition, good concise style, which makes it easily readable, and by the great abundance of splendid illustrations. It does not simply enumerate the facts which constitute the regular subject matter of ophthalmology, but by entering into discussions of scientific investigations it stimulates the interest of the reader, and calls his attention to problems still to be solved.

To mention only a few instances, the chapter on glaucoma is preceded by a very interesting exposé on the interchange of fluids in the eye; in which the author maintains, and gives his reasons for it, the contention of Hamburger of the normal watertight separation of anterior from posterior chamber by the contact of iris and anterior capsule. He opposes Leber's view of the function of the canal of Schlemm as the main passage of efflux; and of the origin of the aqueous from, and its constant production by, the ciliary processes; showing that it was arrived at, not from facts of normal physiology, but from pathologic changes. The discussions on the physiology and pathology of the pupil, the relation of the 5th nerve to the eye, the ocular palsies and their diagnostic problems, the eye symptoms in a series of diseases of the brain and spinal cord, etc., are excellent. There is also a good chapter on simulation, with description of new methods of its exposure. The external appearance is very nice, and the use of different types greatly aids orientation. C. ZIMMERMANN.

NEWS ITEMS

Personals and items of interest should be sent to Dr. Melville Black, 424 Metropolitan Building, Denver, Colorado. They should be sent in by the 25th of the month. The following gentlemen have consented to supply the news from their respective sections: Dr. Edmond E. Blaauw, Buffalo; Dr. H. Alexander Brown, San Francisco; Dr. V. A. Chapman, Milwaukee; Dr. Robert Fagin, Memphis; Dr. M. Feingold, New Orleans; Dr. Wm. F. Hardy, St. Louis; Dr. Geo. F. Keiper, LaFayette, Indiana; Dr. Geo. H. Kress, Los Angeles; Dr. W. H. Lowell, Boston; Dr. Pacheco Luna, Guatemala City, Central America; Dr. Wm. R. Murray, Minneapolis; Dr. G. Oram Ring, Philadelphia; Dr. Chas. P. Small, Chicago; Dr. John E. Virden, New York City; Dr. John O. McReynolds, Dallas, Texas; Dr. Edward F. Parker, Charleston, S. C.; Dr. Joseph C. McCool, Portland, Oregon; Dr. Richard C. Smith, Superior, Wis.; Dr. J. W. Kimberlin, Kansas City, Mo. Volunteers are needed in other localities.

DEATHS

Christopher P. Linhart, Columbus, Ohio, aged 59, died April 15, 1920, from pneumonia. John Peter Marshall, Warren, Ohio, aged 57, died April 15th from septicemia.

PERSONAL

Dr. Dunbar Roy, of Atlanta, Ga., announces the association with him of Dr. Murdock Equen, late of the Brooklyn Eye and Ear Hospital.

At the June meeting of the Ohio State Medical Association Dr. Charles Lukens, of Toledo, assumed his duties as President of the Society.

Dr. A. C. Snell, of Rochester, N. Y., has been elected Chairman of the Section on Eye, Ear, Nose and Throat, of the New York State Medical Society for 1920.

Dr. Raymond J. Sprowl, until recently associated with Dr. George F. Keiper, of La Fayette, Indiana, is now located with his brother Dr. Fred Sprowl at Spokane, Washington. Both are in the practice of ophthalmology and oto-laryngology.

Mr. Russell Tyson of Chicago has been elected to membership on the Board of Directors of the National Committee for the Prevention of Blindness. Mr. George D. Eaton of Iowa will become Field Secretary on June first. He has been Superintendent for ten years of the College for the Blind at Vinton, Iowa.

At a meeting of the New England Ophthalmological Society held Tuesday, April 20th, a complimentary dinner was tendered Dr. William Zentmayer of Philadelphia. Following the dinner Dr. Zentmayer addressed the Society upon the subject of "Recurrent Vitreous Hemorrhage in Adolescence."

Dr. Mortimer Frank of Chicago began the translation of Choulant's "History of Anatomic Illustration" in 1916. This book, published in 1852, is one of the classics of medical literature. Dr. Frank finished his task and turned the manuscript over to the publishers just before his untimely death on April 21st, 1919. A committee of his friends has chosen this volume as a fitting memorial to Dr. Frank.

Professor Julius Hirschberg of Berlin has completed his History of Ophthalmology, which may appear in book form after conditions are more settled in Germany. The "Centralblatt für praktische Augenheilkunde," founded by him in 1877, which was published regularly for forty-three years

was suspended December 1919 on account of the high cost of printing—at that date it having risen four hundred and seventy-five percent over former times, and is still rising.

In 1913 Hirschberg was awarded the silver medal for advancement in Sciences by the Berlin Academy of Sciences. In 1918 he received the gold medal. March 24, 1920, his golden anniversary as teacher in the Frederick William University of Berlin was celebrated. During the last winter he has been given lectures on the History of Ophthalmology.

An event of more than local importance took place recently when Her Excellency Lady Willingdon opened the Elliot Ophthalmic School in connection with the Government Hospital in Madras, India, in recognition of the services rendered by Lt.-Col. R. H. Elliot to ophthalmology in Madras and elsewhere. The teaching will be in the hands of Lt.-Col. H. Kirkpatrick.

SOCIETIES

The last meeting of the French Society of Ophthalmology took place on May 3rd, at 51, Rue de Clichy. Dr. Gonin of Lausanne opened the discussion on the pathogeny and pathologic anatomy of retinal detachment.

At the meeting of the Chicago Ophthalmological Society, May 17th, papers were read by Dr. Herbert Walker on "A Modified Trehpine Operation for Glaucoma" and by Dr. Charles G. Darling on "Sarcoma of Lid."

Dr. Harvey J. Howard read a paper on the "Origin of the Vitreous Humor in the Human Eye" before the China Medical Missionary Association Conference at Peking, the first week in March. This paper will appear later in the JOURNAL.

The courses in Ophthalmology which were suppressed from the curriculum of the University of Mexico in 1915, the last professor being Dr. M. Uribe Troncoso, have been resumed, Dr. Emilio F. Montano having been appointed to the chair.

Dr. Daniel M. Velez has been made Professor of Ophthalmology in the School of Advanced Studies, a Department of the University of Mexico.

The Pacific Coast Oto-Ophthalmological Society will meet in Portland, Oregon, July 29-30-31, 1920. Dr. John Gordon Wilson, Professor of Otology, Northwestern University, will be the guest of the society.

Our Roumanian colleagues have founded in Bucharest a Society of Ophthalmology, and have elected, President, Professor Constantinesco; Treasurer, Dr. Rasvan. We heartily welcome this new society into the brotherhood of ophthalmic associations and hope to profit by the contributions which we feel sure they will make to the study of our specialty.

At the April meeting of the Kansas City Eye, Ear, Nose and Throat Club operative clinics were held in the afternoon by Drs. V. W. McCarty, S. E. Roberts, J. H. Laning, J. S. Lichtenberg, and D. L. Shurnste. In the evening Dr. J. S. Weaver presented a case of brain lesion with eye involvement; Dr. J. W. Kimberlin, one of monocular trachoma. Dr. I. D. Kelley of St. Louis had a paper on "Sphenoidal Inflammation in Relation to Optic Neuritis and Vidian Nerve and Spheno-palatine Ganglion Headaches."

At the May meeting of the Kansas City Eye, Ear, Nose and Throat Club Dr. W. E. Keith presented a paper on "Headaches of Intra-Nasal Origin"; Dr. R. J. Curdy one on "Magnet Extraction of Intra-Ocular Foreign Bodies." Dr. J. W. May showed a case with a piece of glass in the vitreous; eye quiet for past four years and vision 20/40.

The following officers were elected for the ensuing year: Chairman, Dr. J. S. Lichtenberg; vice chairmen, Dr. J. G. Dorsey of Wichita and Dr. H. E. Thomason; Secretary-Treasurer, Dr. A. M. Painter. There are now eighty members in this club, about half from Kansas City and half from surrounding towns.

The Oxford Ophthalmological Congress will assemble at Keble College, Oxford, on the evening of Wednesday, July 14th next, and the meeting will be held on Thursday the 15th and Friday the 16th. On Thursday a discussion on "Perimetric Methods" will be opened by Dr. Luther C. Peter, of Philadelphia. The Doyne Memorial Lecture will be delivered on July 16th by Mr. F. Richardson Cross, the subject "The Nerve Paths and Centers Concerned with Sight." A general meeting will be held during the Congress upon a time and day to be announced in the final programme. We understand that several distinguished foreign guests are expected to attend this meeting of the Congress. Further particulars may be obtained from the Secretary, Mr. Bernard Cridland, Salisbury House, Wolverhampton.

SOCIETIES

The German Ophthalmological Society will meet this year in Heidelberg on the 5th, 6th, and 7th of August. Those wishing to take part in the meeting must notify the Secretary some time before the 30th of June. Notifications later than this will be accepted according to the wishes of the society at the time of the meeting. Papers are limited to fifteen minutes, demonstrations to five minutes. Members of the society are for-

bidden to present papers at the meeting which have been previously published. The manuscripts and discussions, as well as illustrations, must be given to the Secretary before the end of the meeting.

MISCELLANEOUS

The New England Accident Prevention Congress held its Conference in Worcester, March 9th, 10th and 11th. The National Committee for the Prevention of Blindness co-operated by sending its mounted exhibit on Eye Hazards in the Industries.

The Pennsylvania Association for the Blind offers each year a prize of one hundred dollars for the best essay on "Prevention of Blindness," written by a student of the graduating class of the medical school of the University of Pittsburgh. The prize for this year was won by Dr. Albert D. Frost. Dr. Frost's paper will be printed by the Association and sent to interested persons.

The Illinois State department of public welfare, in cooperation with the college of medicine of the University of Illinois, has opened the first of a series of free clinics for the preventive treatment of eye diseases, at Mount Vernon, Illinois.

English Notes—James A. Ross has been appointed consulting ophthalmologist to the Educational Authority of Cumberland and consulting oculist to the Educational Authority of Dumfriesshire. James Eaton has been appointed assistant ophthalmic surgeon to Harrogate Infirmary.

Corporal Herbert Vickers a blinded soldier of St. Dunstan's at the recent examinations of the Incorporated Society of Trained Masseurs known throughout the world for their completeness, passed first in all subjects. That this is no mean accomplishment may be judged by the fact that there are nearly 300 entrants for this examination.

Drs. E. F. Parker, Charleston; C. W. Kollock, Charleston; E. R. Wilson, Sumter; P. V. Mikell, Columbia; Martin Crook, Spartanburg, and W. H. Nardin, Anderson, have been appointed by Dr. James A. Hayne, Columbia, state health officer of South Carolina, as a committee to investigate trachoma and other infectious diseases of the eye, and to formulate rules and regulations to prevent the spread of these diseases among school children.

On February 25th, Mr. Robert B. Irwin, Supervisor of Sight-saving Classes in Ohio, addressed the American School Hygiene Association which met in Cleveland in connection with the Superintendents' Section of the N. E. A. His subject was "Sight-saving Classes for the Partially Blind." Mr. Irwin illustrated his discussion with lantern slides showing the methods used in these classes. Preceding Mr. Irwin, Dr. F. Park Lewis of Buffalo, Vice-President of the National Committee for the Prevention of Blindness, spoke on the "Conservation of the Eyes of School Children."

OPHTHALMIC LITERATURE

These lists contain the titles of all papers bearing on Ophthalmology received within the preceding month. These titles are all in English, some of them modified to indicate more clearly their subjects. These subjects are grouped under appropriate heads the succession of groups being the same from month to month. In the group the papers are arranged alphabetically usually by the name of the author in heavy-face type. After the subject of the paper (Ill.) indicates the number of illustrations. (Pl.) the number of plates, and (Col. pl.) colored plates illustrating the article. (Abst.) shows that it is an abstract of the original article. (Bibl.) tells that the paper is accompanied by an important bibliography. (Dis.) means that discussion of the subject is published with it. Under Repeated Titles are indicated additional publication of papers already noticed. To secure the earliest possible notice writers may send copies of their papers, or reprints, to 318 Majestic Bldg., Denver, Colo.

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